

# Report on the Assessment of Drivers of Deforestation and Forest Degradation in Houaphan Province

---

Draft Report v4.0

August 2015

---

Prepared by: Wildlife Conservation Society Lao PDR Program / GIZ

Presented to:

Department of Forest Resources Management (DFRM) and Climate Protection through Avoided Deforestation (CliPAD) project Financial Cooperation (FC) Component



## 1. EXECUTIVE SUMMARY

---

The Climate Protection through Avoided Deforestation (CliPAD) program is a development project of the Government of Lao PDR (GoL), supported by the Federal Government of Germany through technical and financial assistance, to both pilot incentive mechanisms for climate change mitigation within the framework of REDD+ and establish the Lao PDR's legal framework for REDD+ implementation. CliPAD supports Houaphan Province to establish a provincial REDD+ program based on the requirements of the 'jurisdictional nested approach' (JNR).

A key component of establishing the REDD+ program is an understanding of the drivers for deforestation in the province for the following purposes:

1. To be able to design appropriate mitigation measures to address the drivers of deforestation, and
2. To provide necessary information to calculate a Development Adjustment Factor (DAF) and adjusted Reference Emission Level (adjREL).

The objectives of this report are therefore to identify and assess the provincial level drivers of forest loss.

This study bases the direct driver assessment on the set of nine direct drivers identified in a national level deforestation drivers analysis conducted by Thomas et al. 2009. These are:

1. Unsustainable wood extraction
2. Pioneering shifting agriculture
3. Agricultural expansion
4. Industrial tree plantation
5. Mining
6. Hydropower development
7. Infrastructure development
8. Fire, and
9. Urban expansion.

Underlying, or indirect drivers identified and assessed in this study are:

1. Poverty
2. Population Growth
3. International demand for commodities
4. Village relocations
5. Border crossing (formal and informal)
6. Low law enforcement capabilities
7. Deficient Participatory Land Use Planning (PLUP) implementation
8. Inadequate boundary demarcation and limited management capacity.

While drivers are considered and assessed separately in this study, it is typically the combination and interaction of a number of drivers that lead to deforestation and forest degradation. For **deforestation**, the most important combination of factors are:

1. **Agricultural expansion**, primarily maize production, linked with **pioneering shifting agriculture** using **fire**, and **shortened fallow periods**. The increase in maize production can lead directly to deforestation as upland maize field expand, and can also facilitate further forest cover loss by displacing rice production into new forest areas, and by increasing pressure to reduce fallow lengths. These reduced fallow lengths lead to a net decrease of regenerating fallow forest cover from year to year.
2. **Infrastructure development**, especially **roads**, and the increased pressure on forest areas due to improved access, leading to **unsustainable timber extraction**, and further clearing for **agricultural expansion** through **pioneering shifting cultivation**. Road building financed through allocated timber quotas are also an important deforestation driver, especially when quotas and approved logging areas are not regulated effectively.
3. **Hydropower development**, however the scale of forest loss due to hydropower development will depend on the final number and size of the proposed hydropower projects, as well as regulations regarding the associated forest clearing that accompanies hydropower reservoir clearing. Hydropower projects in remote areas also necessitate improved access and roads.

The most important drivers of **forest degradation** are most likely:

1. **Unsustainable wood extraction**, through legal and illegal selective logging of high value trees.
2. **Infrastructure development**, specifically new roads, as people can access new areas for timber and NTFPs.

The most important underlying or indirect drivers are:

1. **International demand for commodities**, primarily maize for animal feed for Chinese and Vietnamese markets
2. **Low law enforcement capabilities**, leading to illegal timber extraction, poorly enforced conservation and protection forest areas, and the inability of officials to ensure that infrastructure, mining and hydropower projects abide by project conditions and quotas.
9. **Poverty**, which can lead to ongoing pressure to clear upland forest areas as poorer families try to produce sufficient rice. Poverty can also lead to illegal activities such as illegal timber and NTFP extraction as households seek additional income sources.
3. **Inadequate boundary demarcation and limited management capacity**, specifically the forest loss that occurs when boundaries between different village's forest land, and between village land and protection forest land, are not clearly demarcated, understood, or respected.

### 3. TABLE OF CONTENTS

---

1. EXECUTIVE SUMMARY .....	2
3. TABLE OF CONTENTS .....	4
4. INTRODUCTION.....	5
Objective.....	5
Assessment team .....	6
Methodology .....	6
5. FOREST COVER AND DEFORESTATION RATES IN HOUAPHAN.....	7
6. DRIVERS FRAMEWORK .....	10
This study.....	10
Previous studies of Drivers in Houaphan .....	11
7. DIRECT DRIVERS .....	12
Location of Development Activities .....	12
Direct Driver 1: Unsustainable wood extraction.....	15
Direct Driver 2 and 3: Pioneering Shifting Agriculture and Agricultural Expansion. ....	21
Direct Driver 4: Industrial tree plantations.....	27
Direct Driver 5: Mining.....	27
Direct Driver 6: Hydropower development.....	30
Direct Driver 7: Infrastructure development.....	35
Direct Driver 8: Fire.....	41
Direct Driver 9: Urban expansion.....	44
8. INDIRECT DRIVERS .....	46
1. Poverty .....	46
2. Population Growth .....	47
3. International demand for commodities.....	48
4. Village relocations .....	49
5. Border crossing (formal and informal).....	50
6. Lack of effective law enforcement .....	51
7. PLUP implementation and land allocation.....	52
8. Inadequate boundary demarcation and limited management capacity .....	53
8. CONCLUSIONS.....	54
9. REFERENCES .....	56

## 4. INTRODUCTION

---

The Climate Protection through Avoided Deforestation (CliPAD) program is a development project of the Government of Lao PDR (GoL), supported by the Federal Government of Germany through technical and financial assistance, to both pilot incentive mechanisms for climate change mitigation within the framework of REDD+ and establish the Lao PDR's legal framework for REDD+ implementation. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (technical cooperation) and KfW Development Bank (financial cooperation) jointly provide institutional support at national, provincial and district levels for REDD+ concept development, policy advice and support for capacity development as well as piloting mitigation activities in two districts in Houaphan province. CliPAD supports Houaphan Province to establish a provincial REDD+ program based on the requirements of the 'jurisdictional nested approach' (JNR). A jurisdictional approach to REDD+ works within the boundaries of a defined sub-national administrative unit, such as a province or district, to implement REDD+ activities. In the jurisdictional nested approach to REDD+, various sub-national REDD+ initiatives can pilot activities. CliPAD is concentrating on the protection of intact forest landscapes by engaging sub-national jurisdictions to develop and support strategies for reducing deforestation. In order to develop a provincial REDD+ strategy, it is essential to fully understand the drivers of deforestation and forest degradation comprehensively.

Initially CliPAD intended to demonstrate the technical and economic feasibility of a REDD+ project based approach in selected National Protected Areas (NPA) in Lao PDR. Two sites were chosen, namely the Nam Et Phou Louey (NEPL) National Protected Area and the Nam Phui (NP) National Protected Area. For both sites a feasibility study was conducted taking into consideration technical, operational and financial feasibility of the REDD+ project-based approach to demonstrate sustainable financing through emission reductions. The NEPL NPA project site assessment concluded to be technically feasible; however, it proved to be not financially sustainable since project costs would not exceed carbon credit revenues. Due to access restrictions the NP NPA project site was also not possible to further develop as REDD+ project approach. Therefore, and in line with the international discussions and decisions under the UNFCCC, CliPAD decided to explore and conceptualize a sub-national REDD+ approach in Houaphan Province (Moore, Ferrand & Khiewvongphachan 2012). As part of the above mentioned project-based approach in NEPL NPA and NP NPA, CliPAD also conducted an analysis of drivers of deforestation and forest degradation for both sites (see Travers, Moore & Johnson 2011; Moore, Ferrand & Khiewvongphachan 2011). This 2011 study also included a comprehensive literature review of deforestation drivers and associated land use practices from the local to the national scale. This current report does not repeat this literature review as it is still relevant and relatively up to date.

### Objective

The objective of this report is to identify and analyze the drivers of deforestation and forest degradation in Houaphan Province as the sub-national jurisdiction. Proximate causes of deforestation and forest degradation (direct drivers) as well as underlying forces (indirect drivers) are elaborated. This is necessary to identify appropriate mitigation activities for the provincial REDD+ program. In addition, the collected data - especially on planned

developments which will have an impact on forest cover in Houaphan i.e. road construction, hydropower development, mining etc. – provides information to calculate a Development Adjustment Factor (DAF) and an adjusted Reference Emission Level (adjREL) respectively. The NEPL NPA drivers of deforestation analysis (Travers et al. 2011) provides a detailed literature review in current land use practices, the impacts of national policies on forests and historical land use and land cover change in Lao PDR. However, the report (Travers et al. 2011) considers only four districts harboring parts of NEPL i.e. Hiem, Xone, Houameuang and Xam Neua. At the national level, Lestrelin et al. (2013) provide a general overview on drivers of deforestation and REDD+ in Lao PDR. This report builds upon the formerly conducted study conducted in NEPL NPA to update recent drivers of deforestation and forest degradation as well as investigating the drivers of deforestation and forest degradation in the remaining districts in Houaphan Province.

## **Assessment team**

The Drivers of Deforestation and Forest Degradation Assessment in Houaphan Province was conducted by a team consisted of Ms. Luck Bounmixay (WCS), Dr. Sebastian Koch (GIZ), Mr. Tongyang Ardphasoukmoua (GIZ), Mr. Viengxay Vue (GIZ) as well as a representative from the Provincial Office of Natural Resources and Environment (PONRE) Houaphan Province. The assessment was carried out in July and August 2014. The team visited all ten districts and conducted interviews with several offices.

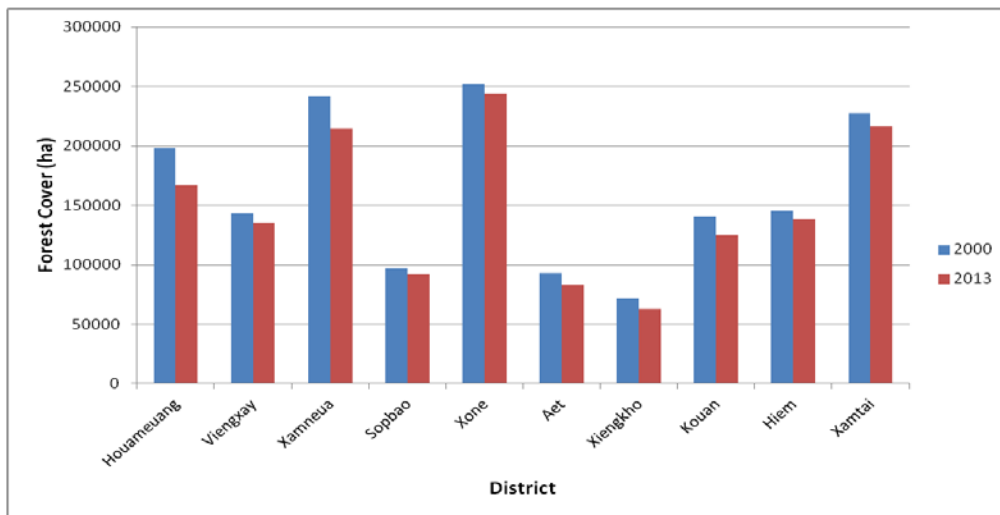
## **Methodology**

At first, the assessment team met the Provincial Project Coordination Unit (PPCU) to explain the need for the drivers of deforestation and forest degradation analysis to establish a provincial REDD+ program and the methodological approach. Semi-structured interviews were conducted with representatives from different institutions including Governor's Office, Provincial Agriculture and Forestry Office (PAFO), Provincial Official of Forest Inspection (POFI), Provincial Office of Natural Resource and Environment (PONRE), Provincial Department Planning and Investment (PPI), Provincial Military, Lao Front for National Construction (LFNC), Lao Women Union (LWU), Department of Energy and Mining (DEM) Provincial Department of Transportation and Rural Development Office (RDO) to discuss the main causes of deforestation and forest degradation. When possible, maps were used to identify hotspot areas of forest loss during the meetings.

The district level semi-structured interviews with the Governor's Office, District Agriculture and Forestry Office (DAFO), District Office of Natural Resources and Environment (DONRE), District Office of Planning and Investment (DPI), LWU and LFNC provided more detailed information the situation in each district. Where necessary, the team met with a representative from each office separately in order to allow different views on the current situation. Maps were used to identify areas that are heavily deforested or under pressure due to illegal activities, concessions etc. From each district, Five Year Development Plans (DSEDP) and available official documents (e. g. statistics on population, agriculture and forestry) were collected for further analyze – especially with respect to the establishment of a DAF. In total, the team consulted with 89 local governmental officials (19 at province level and 70 at district level) including 15 women (see Annex 1 for more details).

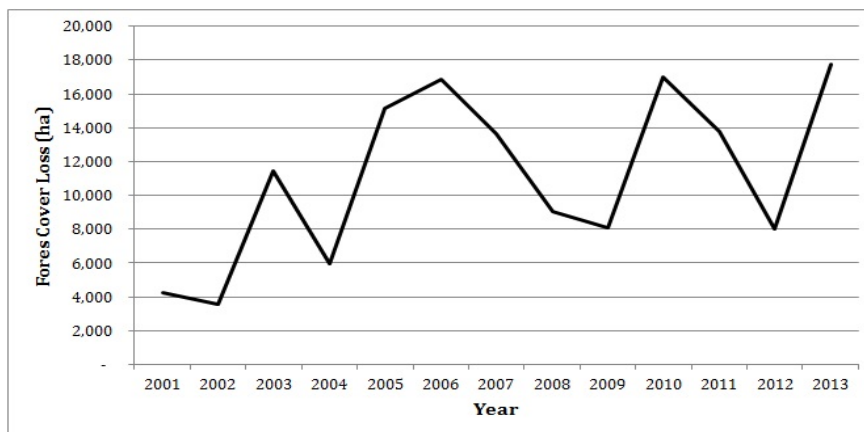
## 5. FOREST COVER AND DEFORESTATION RATES IN HOUAPHAN

Analyses conducted as part of this study indicates that overall forest cover for Houaphan decreased from 1,610,560 hectares in 2000 to 1,477,845 in 2013: a change of 8.2%. This analysis was conducted in ArcGIS using the deforestation dataset presented in Hansen 2014, based on a 40% cover as the definition of forest. This analysis does not discriminate between forest types, and includes forest loss and forest gain to estimate absolute forest loss per year. Forest cover in 2000 and 2013 for each district of Houaphan is displayed in Figure 1.



**Figure 1 Forest cover change by District 2000 – 2013.**

Deforestation rates were not consistent between years, with distinct spikes in deforestation rates being observed in 2003, 2006, 2010 and 2013 (Figure 2). The deforestation that occurred during this period was also not consistent between the different districts, with much higher rates of deforestation being observed in Houameuang and Xamneua Districts (Figure 3). In fact, the high deforestation in these two districts is one of the reasons they were chosen as the pilot districts for the CLiPAD project, along with the proximity with the NEPL conservation forest. The deforestation in these districts also appears to be the primary reasons for the overall province level deforestation spikes. The spatial distribution of deforestation and reforestation between the years of 2000 and 2010 is displayed in Figure 4.



**Figure 2 Absolute Deforestation Rates Houaphan (2001 - 2013)**

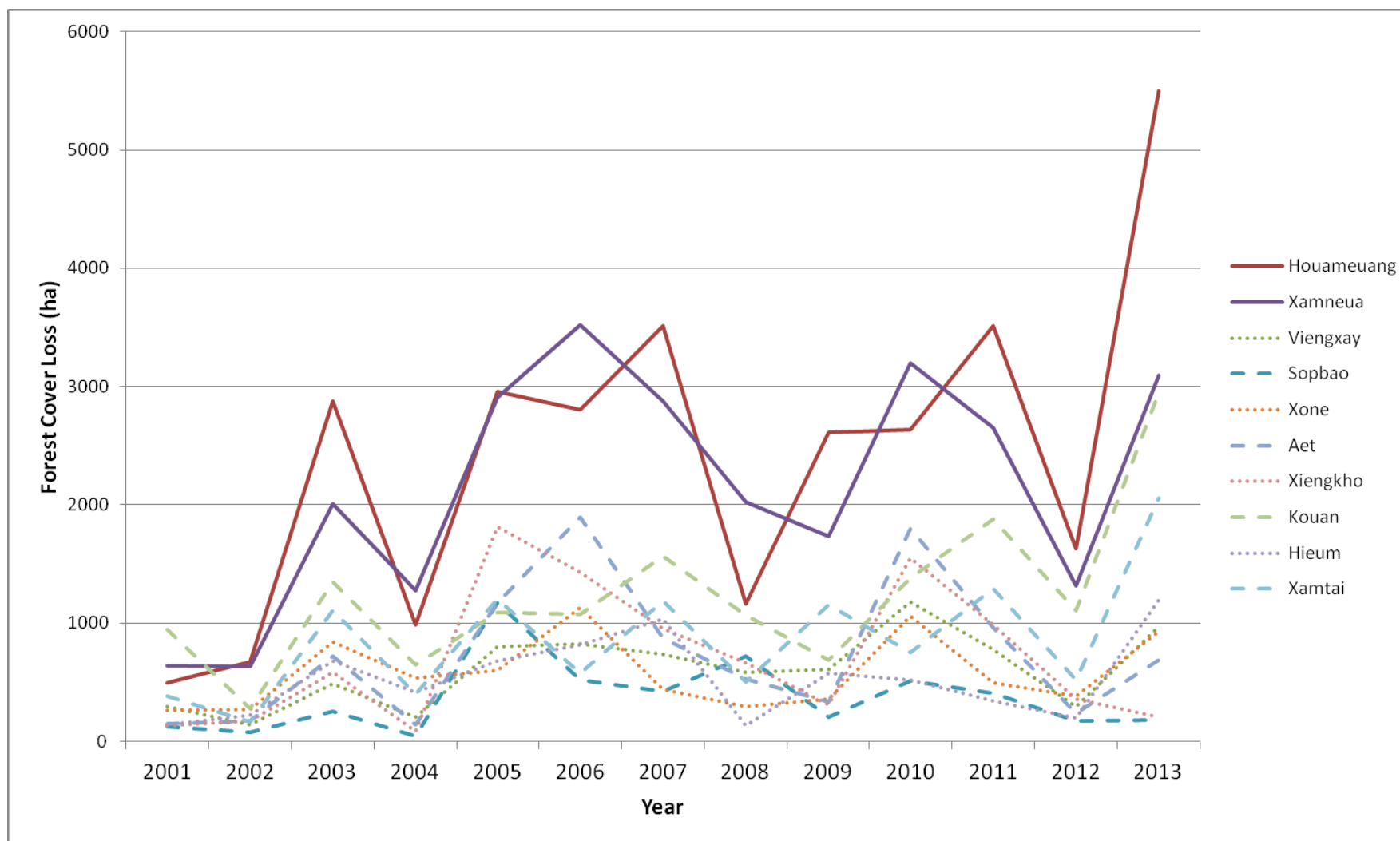


Figure 3 Forest cover loss by Houaphan Districts between 2000 and 2013

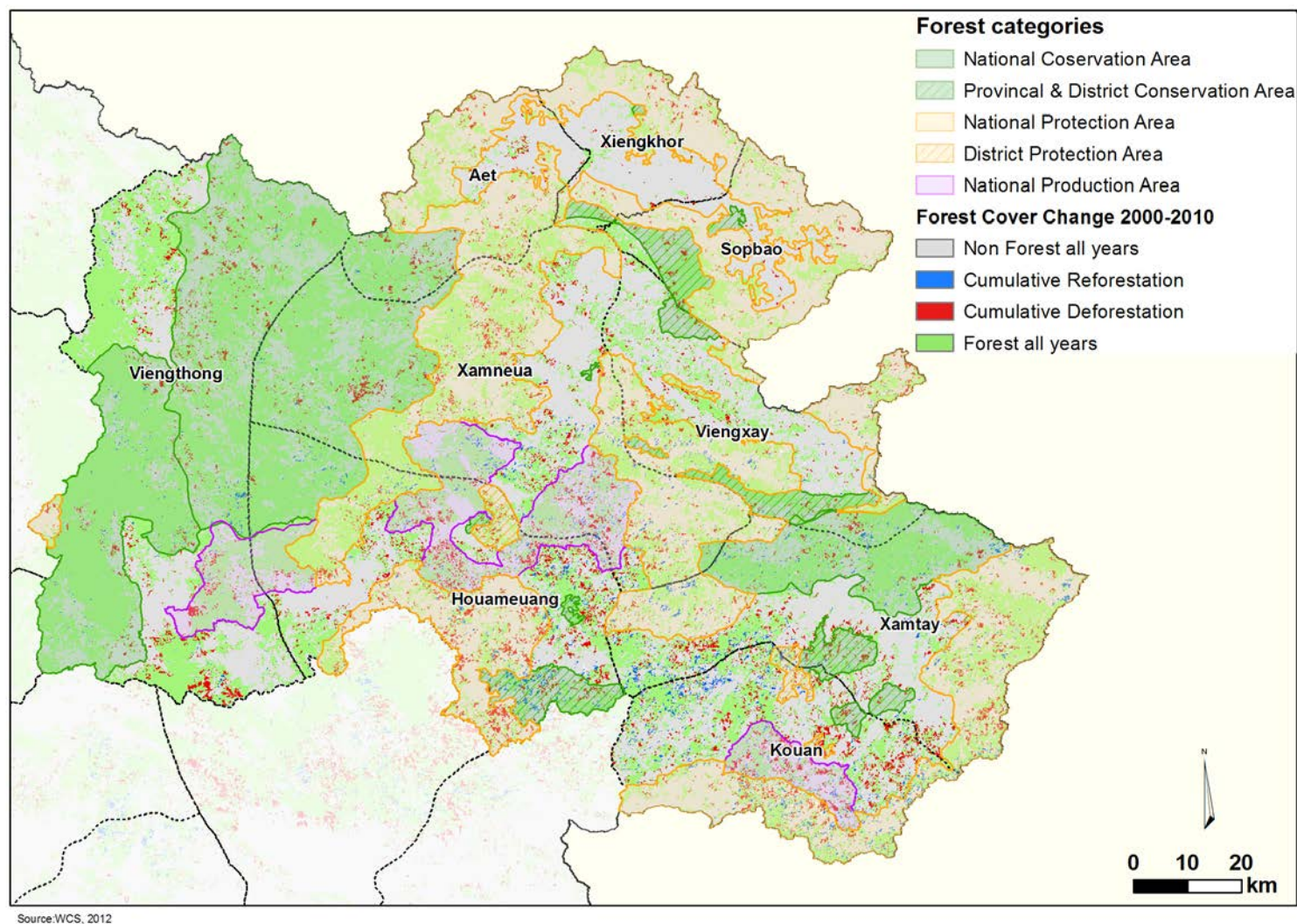


Figure 4 Forest Categories and Forest Cover Change 2000 to 2010

## 6. DRIVERS FRAMEWORK

### This study

To align with nationally recognized direct drivers of deforestation, this study uses the nine national level direct drivers identified in Thomas et al. 2010, and as used in Lestrelin et al 2013. These nine direct drivers are: (1) Unsustainable wood extraction, (2) Pioneering shifting agriculture (3) Agricultural expansion (4) Industrial tree plantation (5) Mining (6) Hydropower development (7) Infrastructure development (8) Fire, and (9) Urban expansion.

This study also identifies eight underlying indirect drivers: (1) Poverty, (2) Population growth (3) International demand for commodities (4) Village relocations (5) Changes to border crossings (6) Lack of Effective Law Enforcement (7) Participatory Land Use Planning (PLUP) Implementation, and (8) Boundary demarcation (Figure 2). The selection of these indirect drivers was based on the fieldwork conducted, and on previous studies of deforestation drivers and driver types in Houaphan (Travers et al. 2011; Moore et al. 2012).

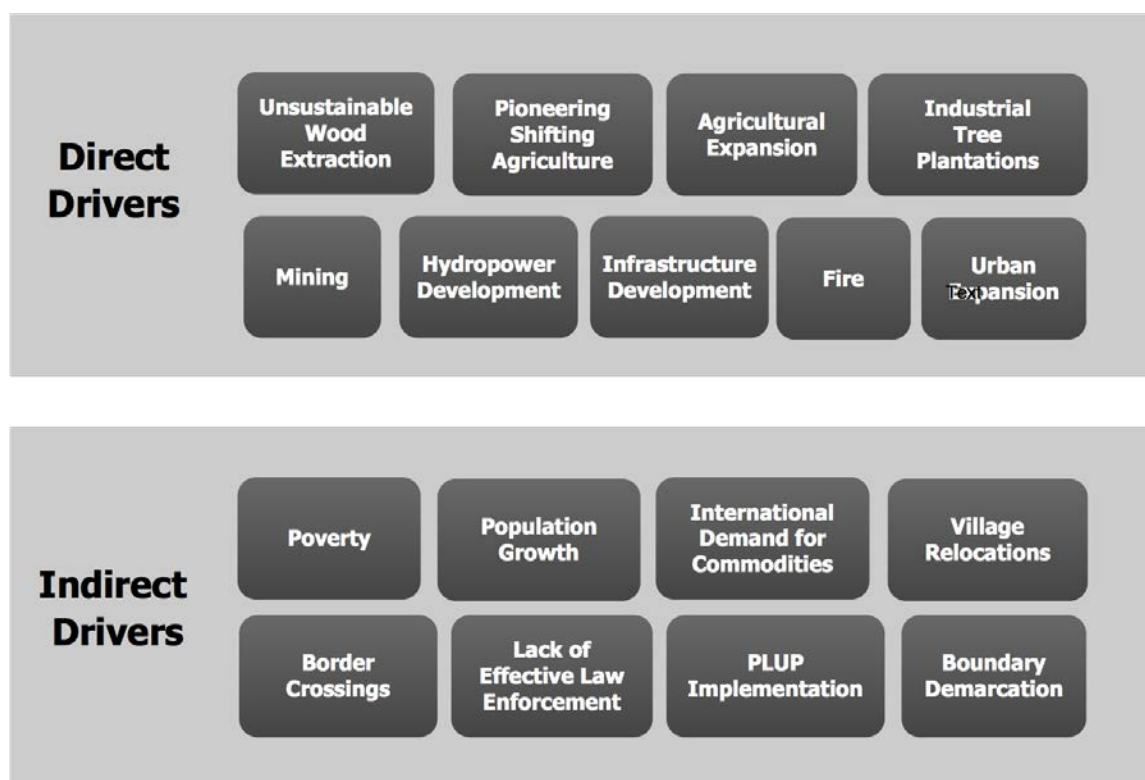


Figure 5 Direct and Indirect Drivers of Deforestation and Forest Degradation in Houaphan.

## Previous studies of Drivers in Houaphan

Three previous reports relevant to deforestation drivers have been produced for the CLiPAD project:

1. Travers, H., Moore, C. & Johnson, A. (2011): Investigation of the Drivers of Deforestation and Forest Degradation in the Nam Et Phou Louey National Protected Area, Lao PDR.
2. Moore, C., Ferrand, J. & Khiewvongphachan, X (2012) Assessment and Conceptualization of a Jurisdictional REDD+ Approach in Houaphan Province, Lao PDR. October 2012. WCS, MAF & KfW.
3. Moore, C., Ferrand, J. & X. Khiewvongphachan (2011): Investigation of the Drivers of Deforestation and Forest Degradation in Nam Phui National Protected Area, Lao PDR.

In their 2011 report, Travels et al. present a conceptual framework that specifies five principal drivers for forest degradation and deforestation within the NEPL NPA. These are:

1. Shifting cultivation (rice, maize, Job's tears)
2. Forest fire (hunting, grass, livestock)
3. Logging for government and household needs (furniture, firewood, house construction)
4. State infrastructure construction
5. Mining.

The 2012 report by Moore, Ferrand and Khiewvongphachan considers the drivers for deforestation and degradation across the whole of Houaphan Province, and divide the drivers into three categories:

1. Underlying causes
2. Immediate Drivers, and
3. Actual sources.

The different causes, drivers and sources specified in the 2012 study are illustrated in Figure 6.

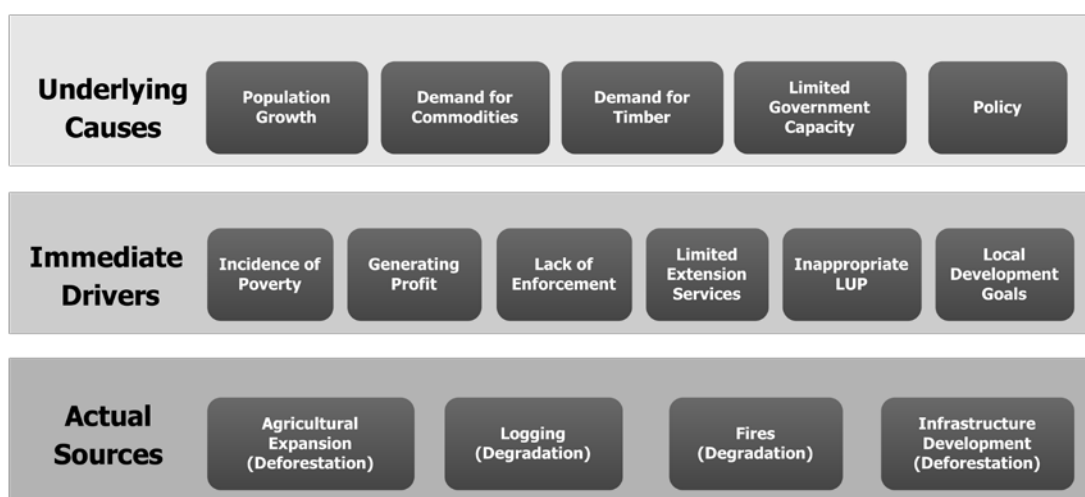


Figure 6 Drivers for Deforestation and Degradation as outlined in Moore et al. 2012

## 7. DIRECT DRIVERS

---

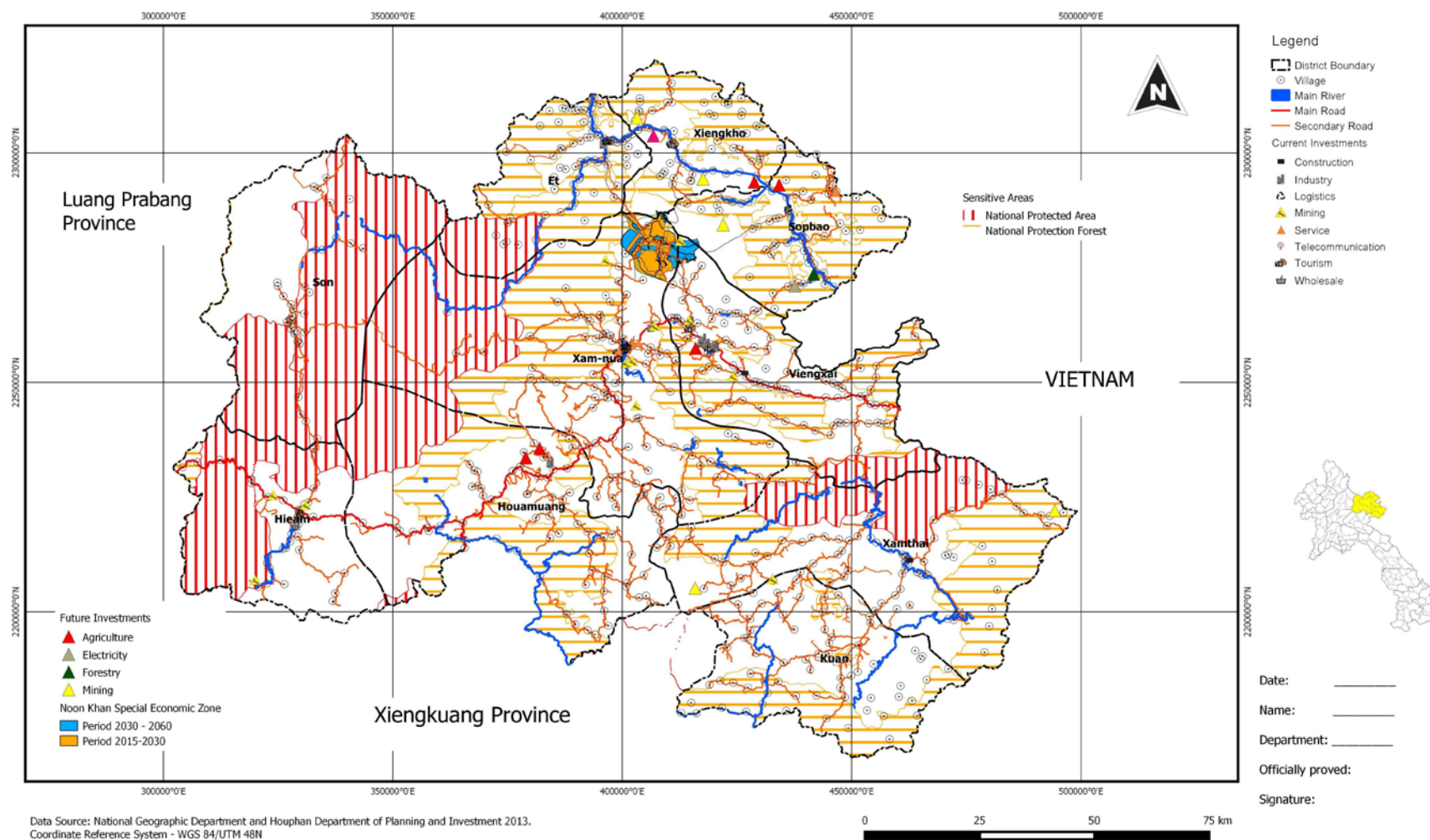
It should be noted that many of the datasets obtained for this study are unlikely to represent an exhaustive list of all the incidents of the drivers of deforestation and degradation in question. This is due to a number of reasons, for example:

- Many proposed activities may not have been properly reported and recorded by the Houaphan Department of Planning and Investment,
- Illegal activities such as illegal logging are inherently difficult to quantify
- Activities in early feasibility stages are often unrecorded
- Incomplete or inadequate data collection by the relevant authorities, for example, data on concessions for hydropower and mining activities.

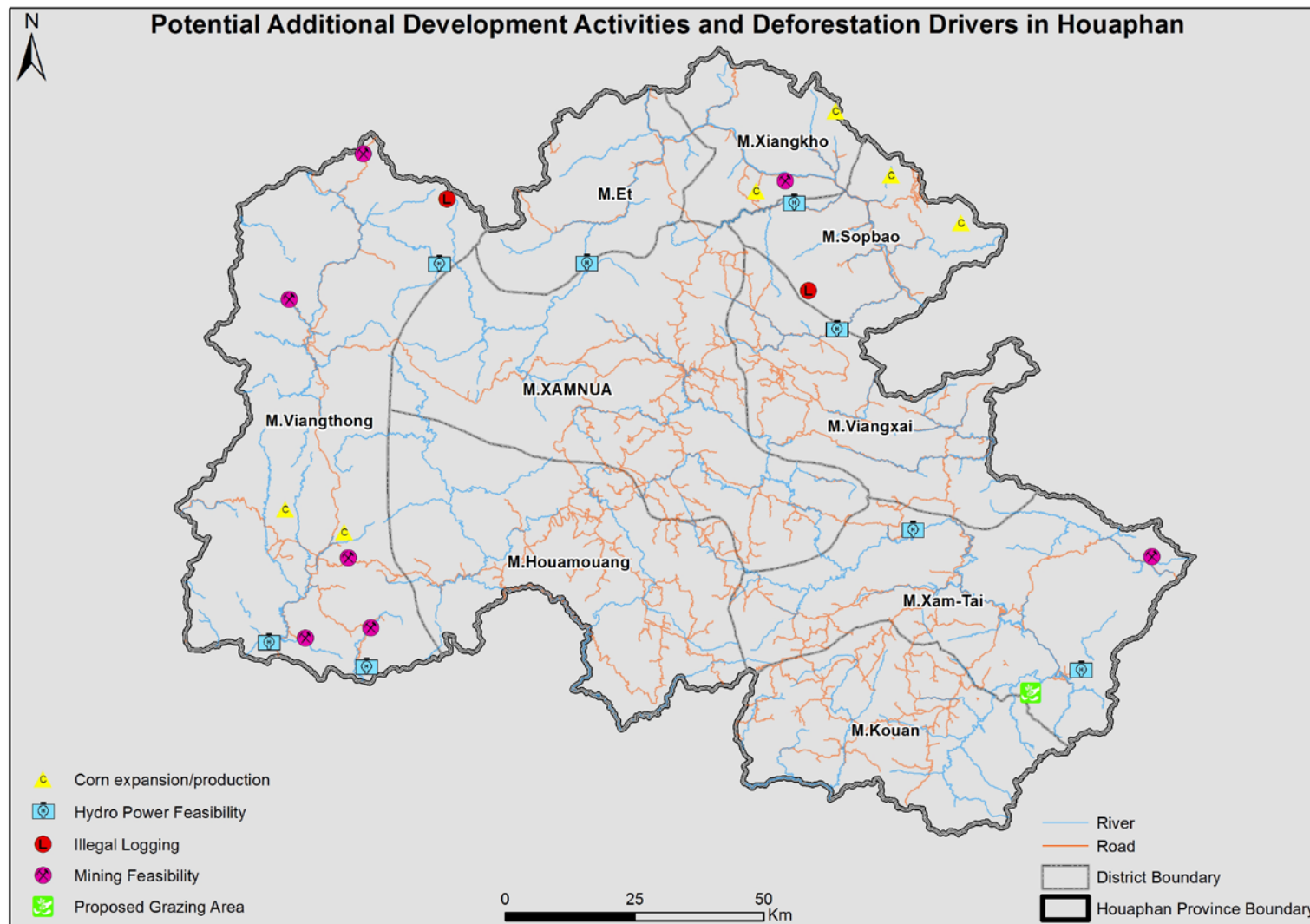
Forecasts of future development activities must take this into consideration.

### **Location of Development Activities**

Development plans from the Houaphan Department of Planning and Investment identify the location of a range of development activities. Many of these activities are likely to lead to deforestation and forest degradation including mining and hydropower activities, planned industrial areas, and the Nong Kang Special Economic Zone (NKSEZ) (Figure 7). Field surveys conducted in 2014 additionally identified the locations of a range of activities that may also lead to deforestation including hydropower and mining feasibility studies, potential grazing areas, and areas of high illegal logging (Figure 8).



**Figure 7 Development activity locations identified by the Houaphan Department of Development and Planning.**



**Figure 8. Additional Development Activity Locations identified during Fieldwork.**

## Direct Driver 1: Unsustainable wood extraction



**Image 1 Confiscated, illegally logged timber (anonymous)**

Unsustainable wood extraction includes all legal and illegal logging conducted in an unsustainable way, that is, removal of timber trees at rates higher than natural regeneration/growth. In this study we will also consider the unsustainable extraction of Non Timber Forest Products (NTFPs) under this category as well.

Logging activities are driven by local demand for house construction materials, firewood, charcoal and timber. In addition to local use, and transport within Laos, there is also a very large market for timber in Vietnam and China that is supplied with timber from Laos, often illegally logged. Illegal logging is often regarded as a major contributor to deforestation and forest degradation in Laos generally (Saunder 2014), and this is also likely to be the case in Houaphan.

All of these activities can have an impact on forestland either through deforestation or forest degradation. Accurate quantification of the impact of logging is difficult due to many activities not being recorded, and the secrecy surrounding illegal activities.

### *Commercial Logging*

Legal logging quotas are granted by the central Lao government for areas in Houaphan Province, without the requirement of district and provincial approvals. Income generated under these quotas is received by the central government. The central government may also issue a quota for district and provincial governments to meet funding shortfalls, and sometimes the province and district allocate themselves timber quotas. For example, in 2013 the Sopbao District allocated itself a timber quota of 200 m<sup>3</sup> for the district development fund.

Between 2010-2013, Houaphan Province<sup>1</sup> reported that 27,860 m<sup>3</sup> of timber from natural forest, 500 m<sup>3</sup> of timber from plantation forest, and more than 2,500 tons of various NTFPs had

---

<sup>1</sup> PAFO 2014

been harvested. During the 2016-2020 period, the province<sup>2</sup> plans to log 20,000 m<sup>3</sup> of timber from natural forest, 2, 000 m<sup>3</sup> of trees from plantation forest, and 5,500 ton of NTFPs of different kinds.

In addition to the recorded quotas, some interviewed officials raised concerns that many logging companies exceed quotas and disregard regulations due to a lack of effective control.

### ***District level information on commercial logging***

Detailed data on logging was not available for the districts, however the following district level information was provided during the conducted field work:

- Officials in **Xam-Tai** said that there has been no approved logging quota since 2007, however others in the district said logging along the Vietnamese border by the same logging company has never stopped and has been ongoing for the last seven to eight years.
- In **Kouan**, there are two main logging businesses, the Bounthavesap Company, and the Sengthong Construction Company Ltd. Interviewed locals believe that the Bounthavesap Company exports timber directly to Vietnam. The Sengthong Construction Company Ltd was given a logging quota of 863,589 m<sup>3</sup> by the central government as compensation for the cost of a road construction project operating from 2010 to 2018. This project involves the construction of a 200 kilometer road from Nam Tai to Phieng Pho and Nong Haed. A condition of this road building contract is logging access to trees at a distance of 500 metres either side of the road.

### ***House construction materials***

Government officials and villagers can apply for a small logging quota for personal requirements such as for house construction. Local government officials can request a five cubic meter quota for personal use; however this request must be approved by the Provincial Governor. At the village level, the village chief is allowed to approve a total of 40-50 cubic meters of logging quota for all families within the village to use for house construction each year. An individual family can request up to 4.5 cubic meters of this total village logging quota. Box 4 outlines the necessary approval steps. Any request that exceeds the mentioned amount is transferred to the district (DAFO) to consider.

In addition to logging quotas given to individual families to use to build their houses, local people still use small trees (*mai kham baep*) for support structures for the construction process. Depending on the intensity and location of collection of these small trees, their use might lead to forest degradation. Villagers cut *mai kham baep* from within forests near their village and sometimes along the main road. The cut trees are usually 3-4 meters high and are sold for between 4,500 and 5,000 kip to local business and the general public. These trees are usually purchased directly from villagers as their harvesting is usually illegal.

---

<sup>2</sup> Ibid

## Firewood



**Image 2 Firewood for sale by the road side (photo: Luck Bounmixay)**

The majority of households in Houaphan currently and traditionally use firewood for cooking and heating. Wood is typically the cheapest fuel for cooking, however it is also used preferentially over other cooking methods such as electricity and gas when these are available and affordable. Most rural farming families collect dead wood from forests and fallow land. Firewood is also collected from trees left over from the land preparation process through slash and burn in the uplands/hills. Families in rural areas often buy firewood from farming families. Interviews conducted as part of this study indicated that nearly 100% of families in the province use firewood for cooking.

The impact of firewood collecting and charcoal production will depend on the source of the wood and the reason for its availability. That is, if wood is available as a by-product of clearing for swidden rice or maize production, then firewood/charcoal use in itself is not a driver for forest degradation and deforestation.

### Box 1: Typical household usage and cost

In Houameaung, a typical family in a district town centre uses around 3 trucks of firewood/year. One truck (about 10 cubic metres of fire wood) costs approximately 300,000 kips, with total yearly firewood cost being 900,000 kip. In Aet District, firewood is sold at a higher price (40,000-60,000/m<sup>3</sup>) than in Houameaung (around 30,000/ m<sup>3</sup>). In Xiengkhor, one m<sup>3</sup> of firewood is sold at a higher price of about 100,000 kip / cubic meter and a family of 9 members spends about 9,000 kip/day or 3,240,000 kip/year on firewood. Because of the high price of firewood, many families in Aet, Xiengkhor and Sopbao burn corn cobs instead of wood for cooking. In other locations where wood is more available and cheap, households do not use corn cobs for this purpose.

While there is some uptake of electric heating, and the use of electric and gas cooking methods in Xam Nuea, many people are still using firewood similarly to meet their needs. In Houameaung, some government and business families living in the central town have started

using non-wood cooking and heating methods, especially when time is short such as at lunch, however wood is still used for cooking in the morning and evening to reduce the amount of money spent on electricity and gas.

### *Charcoal production*

Charcoal is another popular cooking fuel in Houaphan as in most of Laos due to its better burning characteristics when compared to wood. However it is more expensive than firewood and more labor intensive to make, and therefore uptake in poorer villages and households is low. One important source of timber for charcoal making is from recently cleared fallow land. The impact of this source of timber for charcoal on deforestation can therefore be low, as using this timber means that trees from the forest are not necessarily required.

In Xam Nuea, family charcoal businesses can be found in Ban Kan, Hoauxieng, and Maung Ham Tai. A sack of charcoal (about 10 kilograms) is sold between 20,000 and 25,000 kips to families often in Xam Nuea town centre. According to interviewed local government officials, charcoal was introduced in the district as a business in 2010 but it was not very successful because families in town prefer to use firewood.

### *Illegal logging for timber*

It is estimated that more than half, and possibly up to 90% of the total wood harvested in Laos is illegal, and therefore not documented (Saunders 2014). The legal open period for logging for business (*perd pa*) begins 1<sup>st</sup> Oct and closes (*pid pa*) 31<sup>st</sup> May. Any logging activity occurs between 1<sup>st</sup> June to 31 September is illegal but this law is not strictly enforced. During the interview process undertaken as part of this study, a number of examples of illegal logging within districts was discussed:

1. Many areas, such as **Kouan, Xam Tai, Sopbao, Xiengkhor, Aet, and Xone** share a border with Vietnam. This can make it difficult to control illegal logging activities and cross border transport of illegal timber. Locals report that timber from valuable tree species can be seen being taken across traditional borders during night and daylight hours.
2. In one example, reported by officials from **Xiengkhor**, a Vietnamese business operated illegal logging at Phiengsa Village Cluster and removed all large trees.
3. In **Xam Tai**, the local government confiscated more than 200 cubic metres of illegal timber. According to local officials, the confiscated timber was sold and the money was added to the local government budget.
4. In **Hiem**, a logging business that conducted illegal logging was fined and the logs were confiscated. The company later asked if they could purchase the confiscated logs.
5. Officials also indicated that illegal logging had been recorded in Phoulouey Noy, Papaek Village, and B. Na Jak in **Houameuang**, and in B. Houyma in **Xam Nuea**.
6. Logging occurred in Pha Tee, mostly in **Xam Nuea** district, where valuable trees (*mai long leng*) of between 2 and 2.5 diameter were found. In this area, two elephants were used to transport illegal logs. In this district, logging also occurred inside the conservation forest area along the **Xam-Nuea District** border. In this area, valuable mother trees have been sign posted for protection (with Japanese support), however

loggers simply removed these signs and placed them next to nearby small trees of the same species, and cut down the mother trees.

7. Local government officials in Sopbao, **Kouan** District said that logging was degrading the forest rapidly, and that illegal logging had occurred at **Yord Houy Hung**, an area that acts as a good water source for paddy fields of many villages. Illegally logging also happened in the forest at **Phiengsa Village Cluster** where large trees have been removed. Locals indicated that Vietnamese business is involved in this illegal logging.
8. Some logging businesses do not directly log the trees but they provide support to villagers and local traders, for example, by supplying them with chainsaws or sting saws. This happens in forest areas in **Sone, Sopbao, Hiem, Kouan, Xiengkhor, Xam-Tai** and **Aet** Districts which share a border with different administrative areas including Vietnam and Xiengkoaung. Villagers that have cut timber then sell it to middle men / traders. To avoid police, villagers use tractors or motorbikes to transport wood from the forest to their villages where traders come to purchase it. Villagers in some villages transformed logs into furniture (or change its shape) to avoid being reported.
9. Illegal loggers created a 15 km road from Houyma Village into controlled used zone forest area in **Xone** District and potentially more logging will take place, more NTFPs will be collected and more wildlife will be hunted.
10. Illegal logs appear to be going through **Xam Nuea**, however, after the road to **Xone** is completed, they might go to Vietnam through Xone.
11. Officials in **Viengxay** indicated that illegal logging activities might be occurring in the district conservation forest and protection forest areas, where there are still many valuable tree species such as Mai Hing Horm.
12. Further, **Xam-Tai** and **Xone** have valuable tree species such as mai long leng and mai doo that can demand prices as high as 2,500,000 kip/m<sup>3</sup> and 8,000,000 kip/m<sup>3</sup> respectively. These are likely to become targets for loggers, if forest protection is not improved.

The prevalence of illegal logging and trade makes determining accurate figures on commercial scale logging very difficult.

### ***Unsustainable harvest of NTFPS***

Non timber forest products (NTFPs) are an important component for village incomes, and for consumption, particularly during times of stress such as rice shortages. Traditional rates of harvesting are likely to have been low and sustainable, however large external markets for these products, such as red mushrooms, wildlife etc can drive unsustainable harvesting rates, leading to forest degradation.

#### **Red Mushrooms**

In Sop Kok and Tam La area inside the NPFA in Hiem District, there is availability of chestnuts and *hed kor daeng* (red mushrooms) which are in high demand from outsiders (Chinese, Korean and Japanese). Fresh mushroom is sold at 100,000- 200,000 kip/kg and at 500,000 kip/kg when dried. This red mushroom is harvestable from May to July.

This harvest requires families to spend nights and days in the forest and temporarily claim a certain area to make sure mushrooms are not taken by others. During this period there can be additional forest degradation because while in the forest villagers harvest other NTFPs including tea, cardamom (sold at about 200,000kip/kg), orchid (Dok Poeng), *keu ham*, as well as some illegal felling of trees. Often the harvest of these forest products is unsustainable and uncontrolled, and important NTFPs have disappeared from some areas.

### Tea

In Sone District, there are large tea trees in the Pa thee area. The military based at this area reported that large tea trees are also found in other areas in the forest. Chinese businesses want to invest in the tea business through concessions and they sometimes mark existing tea trees. It is not known to local people if these marks indicate a survey or a claim over the trees because there were no approvals or notifications given by the district for this activity. Villagers sometimes unsustainably cut down the tea trees to collect tea leaves for their own consumption and to sell to traders. Harvesting of leaves by felling large trees also occurs in Houameung and Xam Tai.

### Bamboo

In Sopbao, a Vietnam business (Long Vern) is operating a Paper Processing Factory with an allocated bamboo harvest quota. In this business, local villagers are trained to harvest bamboo in a sustainable way (training in this harvest method is also provided by the GRET bamboo project.) and sell bamboo poles to the business at the price of 90 kip/kg. However, there is a lack of available labor from villagers for this harvest as they spend more time on other farming practices. This has led to a shortfall in bamboo feedstock for the business. Consequently, the company sources bamboo itself and it has been reported that this can lead to unsustainable harvesting.

In Viengxay, significant unsustainable harvest of bamboo occurs at Maung Poon and Maung Phoon clusters where families harvest bamboos shoots (*noh hok*). These shoots are boiled then dried and sold to a Vietnamese business for 20,000 kip/kg. Outsiders, mainly people from Xam Nuea, also come to the district to harvest raw bamboo products (poles and shoots) for their family consumption and also for sale, often at unsustainable rates.

## **Direct Driver 2 and 3: Pioneering Shifting Agriculture and Agricultural Expansion.**



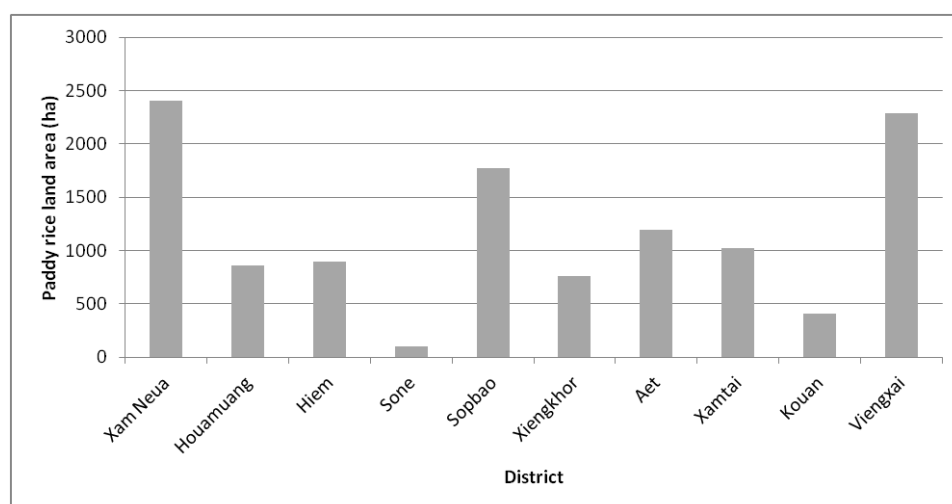
**Image 3 High intensity shifting cultivation in Houaphan (Photo: Sebastian Koch)**

Direct Drivers 2 and 3 are considered together in this analysis, as a primary cause of pioneering shifting cultivation is likely to be expansion of maize production in upland systems, and competition for land that is also traditionally used for upland rice production in swidden systems. Interviewed officials indicated that an increase in international demand for maize led to an acceleration in pioneering shifting agriculture around 2005, as farmers opened new areas of forest for income generation.

Despite government initiatives beginning in the 1990s to eradicate shifting cultivation, these practices continue. Most inhabitants in many districts, primarily Houameaung, Sone and Hiem practice traditional shifting cultivation. While the government announced in 2014 that 88 villagers had completely stopped shifting agriculture, this might not reflect the reality on the ground. Data collection and reporting systems, especially in relation to slash and burn cultivated land areas in the hills, are unlikely to be accurate. This is partly due to a lack of capacity and training for local governmental staff to collect and manage the data. There is also a lack of adequate resources, and possibly an unwillingness to report data that is not in line with government policy.

### ***Paddy rice production***

While paddy rice production, and expansion of paddy rice production is not a significant driver of deforestation, the limited potential for increasing paddy land is likely to influence the requirement to undertake upland shifting agricultural practices. For example, in mountainous areas experiencing increasing demand for cash crops or increasing populations, the pressure to clear previously forested areas may be higher than in areas where paddy systems can be expanded. Figure 4 displays the area of paddy rice production in each district in 2013.



**Figure 9 Paddy rice land area by districts in Houaphan in 2013.**

(Source: Adapted from Province Social Economic Development Report (2014)).

### ***Upland rice production***

Rotational upland rice production can be conducted sustainably and does not necessarily lead to increased rates of deforestation and forest degradation. However, increasing populations and increased demand for cash crops is leading to an overall net increase in net deforestation in Houaphan, as fallow rotations are shortened and new areas of forest are opened up through pioneering shifting cultivation.

The GoL has a stated aim of reducing shifting cultivation, however government set targets for shifting cultivation areas have been exceeded for the years that data is available for Houaphan (Table 2). Further, most interviewed district officials believe that the number of hectares of land in the upland used by villagers to cultivate agricultural crops is higher than the number officially recorded because officials often rely on what villagers reports (number and area of upland plots cultivated) when collecting statistics on land. Villagers often under report the actual land area under cultivation because plots are sometimes in areas where clearing is not permitted. District and provincial records on upland rice production typically do not match, possibly indicating inaccurate data.

**Table 1 Upland rice land area under a slash and burn system and rice harvest (tons) in Houaphan, 2010-2015.**

Year	Rice Land Area in the Uplands (ha)		Harvest (ton)	
	Area Planned to Cultivate	Actual Cultivated Area	Expected Yield	Actual Yield
2010-2011	11,000	13,633	-	32,808
2011-2012	11,250	16,735	28,533	34,637
2012-2013	11,135	17,907	30,064	37,967
2013-2014	-	13,032	-	31,276
2014-2015	-	12,932	32,330	-

Source: Adapted from HP A&F Report 2014

Upland rice is predominantly produced for household consumption, with rice sufficiency being the major consideration on how much land to cultivate. As cash crops that can be grown in similar swidden systems increase, there is increasing competition for available land. As the demand for cash crops increase, and local populations increase, the pressure to clear new areas of forest through pioneering shifting cultivations can lead to significant net forest loss.

As an indicator of potential demand for rice, including that grown in swidden upland systems, an indicative rice sufficiency calculation was conducted. Available data on rice harvested from paddy land, upland rice production, and total population in the province (in 2013) are used to make the calculation (Box 2). This calculation includes a comparison between the total quantity of rice harvested from the total available rice production land, and the national rice consumption index: the amount of rice one person consumes per year (350 kg of unmilled rice / about 170 kg of milled rice). The result of the calculation (Table 3) illustrates that the province has experienced rice shortages over the three years examined: 7,917 tons in 2011, 4,112 tons in 2012, and 2,073 tons in 2013. These shortages are likely to be adding to pressure to clear new upland farming plots.

**Box 2: Formula used to calculate rice Houaphan produced in comparison to national rice consumption index (ton).**

- A. Total rice produced: paddy rice + upland rice land (ton)
- B. Rice produced by person: total rice % total population
- C. Rice consumption needs: total population x 350 kg (of unhusked rice)
- D. Rice shortage: C - B

**Table 2. Estimated rice shortage in comparison to the rice the province produces and national rice consumption need**

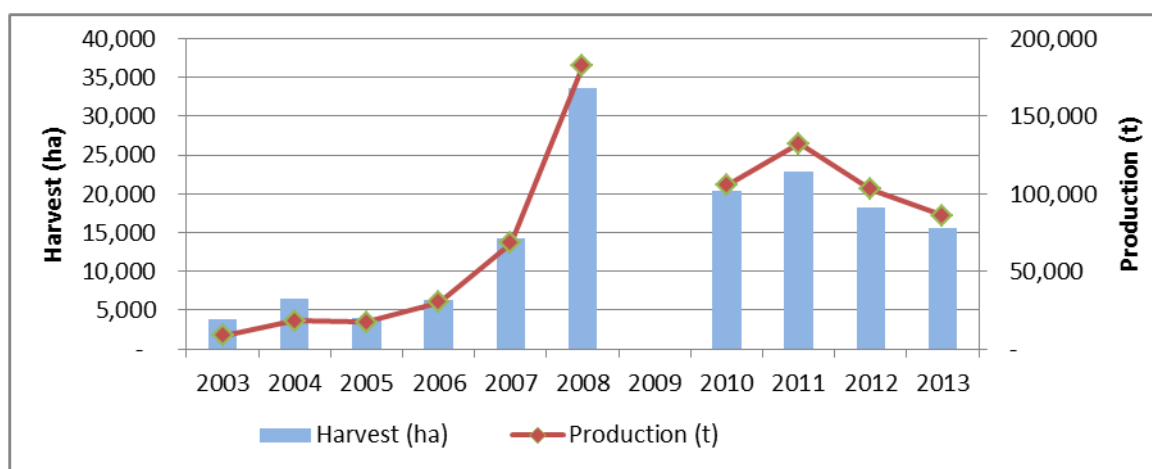
Year	2010-2011	2011-2012	2012-2013
Total irrigated paddy rice (ton)	60,859	63,267	63,177
Total upland rice (ton)	32,808	34,637	37,967
Total population	29,0241	29,1473	29,4907
Total rice consumption need	101,584	102,016	103,217
Rice produced/person (to)	0.32	0.33	0.34
Estimated total rice shortage (ton)	7,917	4,112	2,073

## Maize production

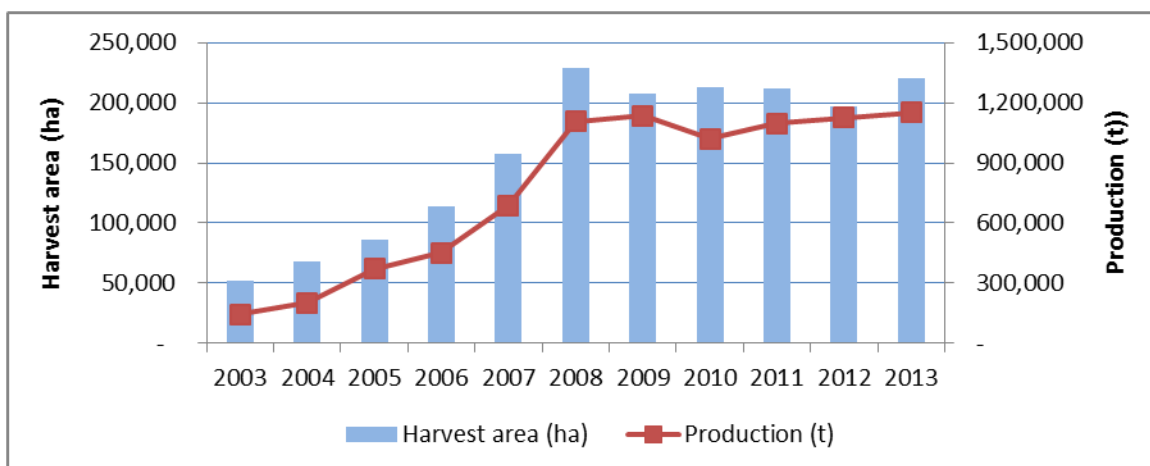


**Image 4 Large scale deforestation for maize production (photo: Sebastian Koch)**

Maize has been historically produced in Houaphan, however production began accelerating markedly in the mid 2000s (Figure 10), in line with the national trend (Figure 11). Contract farming for fodder maize to meet Vietnamese demand began in 2000 and is the primary reason for the accelerated production (Willi 2011). Vietnamese demand is primarily due to the increased demand for meat, as maize is a primary feed stock for intensively raised animals, primarily pigs.



**Figure 10 Houaphan harvest area and production 2003 – 2013 (Source EMC Maize Value Chain Analysis 2015)**



**Figure 11 Lao PDR harvest Area (Source EMC Maize Value Chain Analysis 2015)**

Maize production typically occurs in the same areas used for upland rice production, and is leading to pioneering deforestation as rice farming areas are displaced by maize. Areas cleared for maize are often much larger than areas cleared for upland rice. In addition to production in shifting cultivation areas, maize is also produced in some areas of permanent production. For example, the Hmong villages in Pahang Cluster in Sopbao, and Bomfard and Nam Nern in Hiem districts produce maize in such permanent production areas.

In some shifting cultivation areas, maize is often grown on land that was used in the previous year for upland rice production. Maize may be grown for several years before productivity declines to the point where it is no longer viable without fertilizer inputs. To increase maize productivity, chemical fertilizer is used in some areas particularly in Aet, Xiengkhor and Sopbao districts. Swidden maize systems are therefore often a much more intensive use than traditional swidden rice systems, and these areas are less likely to be able to regenerate quickly, may take longer to regain soil fertility, and are more likely to have increased weed infestation.

The allocation of land and labor resources to maize production over rice production by villagers can lead to rice shortages, especially if income is not saved for the purposes of buying food. In these circumstances, many families will rely on forest resources for food and income. This can drive deforestation and degradation through activities such as illegal logging, and overharvesting of NTFPs.

The total areas of maize cultivated can be volatile from year to year for a number of reasons. For example, demand for maize for animal feed in Vietnam decreased suddenly in 2011 due to a reduction in the international price of wheat, an alternative animal feed stock. Another cause is variable rice prices. Available statistics show that total land used for maize production in Houaphan reduced from 22,608 in 2011, to 18,367 in 2012, to 15,660 in 2013 as shown in the Table 4. This reduction was due to increasing rice prices and a corresponding increase in allocation to land and effort to rice production. However the land area used to grow corn rebounded to 19,698 ha in 2014.

This pattern was followed in areas close to NEPL NPA in Xam Nuea, Aet, Viengthong, and Houameaung Districts. From 2006 – 2011, the share of total harvest area held by these districts dropped from 53% to 21%, before rebounding to 51% in 2013 (EMC, 2014).

The statistics obtained during the interviews indicated that Xiengkhor District has a much larger land area used to produce corn than all other districts together: 2,270 ha in 2012, 31,600 ha in 2013 and 22,000 ha in 2014. In Hiem District, local officials said that commercial maize production increased significantly from 2009, and this trend has doubled in 2013 however detailed figures are not available.

**Table 3 Land area used to produce corn and harvest in the province, 2006-2013**

**Land area used to produce corn and harvest in the province, 2006-2013.**

	2006	2008	2010	2011	2012	2013
<b>Harvest area (ha)</b>						
Xam Nuea	1,500	2,260	134	450	450	450
Aet	335	3,456	1,800	2,175	2,081	2,200
Viengthong	585	1,700	1,320	820	1,854	2,110
Houameaung	905	3,633	2,230	1,420	3,544	3,290
Others	2,975	22,501	14,871	18,045	10,336	7,615
Total	6,300	33,550	20,355	22,910	18,265	15,665
<b>Production (ton)</b>						
Xam Nuea	6,850	12,200	515	2,750	2,650	2,700
Aet	1,650	19,220	8,998	13,050	11,446	13,200
Viengthong	2,700	9,900	7,420	5,640	12,580	13,288
Houameaung	4,500	19,600	11,596	6,670	16,649	15,463
Others	14,400	121,400	76,741	104,290	59,735	41,509
Total	30,100	182,320	105,270	132,400	103,060	86,160

Source: Report on Maize Value Chain Analysis (2014)

More detailed information on Maize production and market chains in Houaphan can be found in the 2015 Report: Maize Value Chain Analysis, Houaphanh Province, Lao PDR, Final Report, February 2015.

### **Opium production**

Opium production is included in this assessment; however it is unlikely to be an important driver for deforestation and degradation. This is due to the small footprint that opium production has on forested areas.

Despite official opium eradication program, villagers still grow opium poppies in some areas and this can impact on forested areas. Most interviewed governmental officials indicate that villagers cleared good forest for opium production, that is, forest areas with many big trees, rivers, cooler microclimates and wild animals of different kinds. These areas are far away from the village and town centre, with produced opium poppies sold or used for local consumption.

In Houameaung, there were about 10 ha of opium cultivated area in 2009 but it increased to 50 ha in 2014. This cultivation pots can be found at Pa Tee, Hoary Ma and it is inside NEPL NPA. The officials in this district said that villagers were offered high prices for opium. For example, one kilogram was sold for 2,500,000-3,000,000 kip 21 years ago, however these days a kilogram can be worth between 20,000,000 and 30,000,000 kip.

## Direct Driver 4: Industrial tree plantations

Industrial tree plantations, specifically rubber and teak, are common across the Northern Laos provinces; however their impact in Houaphan is relatively limited. Coffee has also been introduced however areas planted to date are not significant.

**Teak** is planted in some areas, predominantly by small holder farmers planting small plots, typically smaller than one hectare. A literature review including a previous study of drivers of deforestation in Houaphan did not indicate that teak plantations were an important drivers in the area considered (Travers et al, 2011 – Nam Et Phou Louey).

**Rubber** is widespread in the northern provinces of Luang Namtha, Luang Prabang, and Oudomxay; however uptake in Houaphan has been very low. One MAF report (February 2009) indicated that 100 ha had been planted prior to 2008. As with teak, a literature search including the Travers et al. (2011) report did not indicate rubber as an important driver for deforestation or forest degradation.

**Coffee** has a limited history of cultivation in the vicinity of Nam Et-Phou Louey. Areas were planted with the Lao-American project between 1990 and 1998, and a local promotion effort between 2010 and 2012 ended with up to 30 hectares planted, mostly in Xon District (Dale 2015). The Northern Uplands Development Program (NUDP) is the only agency currently promoting coffee in the area, and under this program about 62 ha of coffee in four villages of Xon District has been planted (Dale 2015).

Whether these industrial drivers will become important drivers for deforestation and forest degradation will depend on the effectiveness and scale of future promotion activities, and on the details of plantation implementation.

## Direct Driver 5: Mining

Mining ventures in Houaphan are mostly Vietnamese or Chinese owned, and are in the early stages of exploration and implementation. Without effective controls over mining concession areas, and depending on the footprint of the proposed mines, this sector may be an important direct driver for deforestation in Houaphan in the future. The locations of some areas designated by the Provincial Government as mining areas are indicated in Figure 7.

Officially, there are 14 mining concessions in Houaphan: four are approved by the central government and 10 are approved by the provincial government (Table 5). In 2014, four provincial approved level mining concessions were cancelled because they caused destruction to natural resources including forests in contravention of their concession agreement. Four additional small operations did not continue partly because they did not find the quantity of resource they expected.

**Table 4 A list of mining concession businesses approved by the central and provincial level**

Name of Business		Types of Mining	Concession			Remarks
			Village (district)	Area (ha)	Approved date	
<i>Central Government Approved Level</i>						
1.	Joint venture Lao-Viet Company	Sn,Pb,Zn	Hauyjeun (K)	1,200	31/10/2008-2020	Under operation
2.	LAO SPG CMC Mining Co., Ltd	Fe	Ta Aen (VX)	200	12/09/2006-2015	Under operation
3.	Tien Hiew kao Bang Company	Fe	Kang/Hang (XT)	771	03/10/2011-2021	Under operation
4.	Lao Pou Ying Mining Company	Cu,Fe,Ni,Co	Phiengyam (XK)	2,400	22/01/2013-2033	Under operation
<i>Provincial Government Approved Level</i>						
5.	Road Construction and Mining Company	Mg	Loup (XK)	100	15/12/2011-2021	Under operation
6.	Tien Hiew kao Bang Company	Fe	Fong Xang (VX)	17	08/07/2011-2021	Stopped (2014)
7.	Meuang Xam Mining Company	Mn	Maung Nga (VX)	50	01/12/2011-2016	Under operation
8.	667 Vietnamese Company	C	Done (XN)	30	24/05/2010-2015	Cancelled in 2014
9.	Houang Fouk Lang Xern	Fe	Phoun Kang (VX)	20	08/07/2011-2021	Under operation
		Fe	Phoun Nue (VX)	50	28/08/2012-2022	Under operation
		Fe	Ta Out (VX)	50	28/08/2012-2022	Under operation
10.	Fu Ya Cheuang Xing Company	Mn	Maung Nga (VX)	30	08/09/2010-2030	Cancelled in 2014
		Mn	Phouxay (VX)	50	12/01/2012-2027	Cancelled in 2014
		Fe	Kaeng Phoun (VX)	4.5	12/01/2012-2022	Under operation
		Fe	Phieng Kai (VX)	60	08/07/2011-2021	Cancelled in 2014
11.	Foun Chia and Chia Sopbao Factory	C	Ham Nue (XN)	105	20/08/2012-2027	Stopped
12.	Meuang Xam Mining Company	Mn	Phouxay(VX)	4.7	06/12/2011-2016	Stopped
13.	Souk Tien Company	Sn,Pb,Zn	Bouk (K)	100	03/08/2012-2017	Stopped
14.	Yui Chi Industrial and Commerce Company	Granite	Kaeng Nai (K)	20	24/02/2012-2017	-
Source: Department of Energy and Mining in Houaphan (2014)						
*K= Koaun, VX = Viengxay, XN=Xam Nuea, XK= Xiengkhor, XT=Xam Tai. **PG=province governor						

In the past the Provincial and District governments have sometimes approved mining businesses without all of the correct approval processes being followed, and without all the separate approvals that are required being granted. This is partly driven by a need to finance particular provincial and district development activities. For example in Xam Nuea, a Vietnamese company was given approval by the provincial government to operate a stone mining business without the correct approvals.

Another example is a mining concession area in Meaung Ham village covering more than 100 ha that was granted by the Provincial Government. The Central Government requested that the concession be cancelled due the correct approval process not being followed, however, the company had already commenced initial mining activities and it has asked for US\$ 21,000,000 as compensation from the province. This proposal is currently under consideration.

According to interviewed local officials, mining activities approved by the central government create more impacts on the environment (including forest area) than the smaller scale mining projects approved by local governments. This may be due to the scale of the projects, limited central government staff understanding of the local context, and due to limited participation by local authorities and parties during the approval and feasibility processes, and during implementation monitoring. Officials in many districts including Aet, Xiengkhor, Sopbao and Xam Tai indicated that central government agencies allowed businesses to conduct mining surveying activities in their districts without the involvement or notification of district officials and villagers.

For example, with an approval from the central government in 2011, the private business, Chinese-Lao Phou Yeung, has been searching for resources along 400 to 500 km of the Nam Ma River. In 2013, more than 10 machines were used by Vietnamese companies to explore for gold along the Nam Ma River stretches that flow through Sopbao, Xiengkhor, and Aet.

The district and provincial role in environmental and social regulation of mining operations approved at the central level is not clear, and enforcement of national and provincial laws regarding these considerations, as in many parts of Laos, are unlikely to be adequate. In practice, some district staff (mainly from DAFO and DONRE) are assigned to monitor mining operations. They visit the project site monthly but they lack both the required technical knowledge of the activities, and an understanding of the potentially adverse social and environmental impacts. Also, the mining companies directly pay district authorities daily allowances when in the field, which may impact on the quality of assessment.

### ***Additional district level information identified in this study***

In addition to the 14 official mining concessions described in Table 5, a number of mining activities not officially identified at the provincial or national level were identified in this study. This information was collected during interviews, and further verification is required to be confident in locations and impacts described.

- Mining exploration in **Xiengkhor** is occurring in Phiengyam, Phonethong, and Nakharm Villages.
- In **Aet** District, villages affected by exploration include Hoauiyong, Hoauiyom, Phakphaen, Nongtop, and Phakeo Villages.

- By the end of 2014, about one thirds of total land area of **Sopbao** District was under mining exploration including gold and copper, and this exploration involved clearing forest for access roads and surveying areas.
- Exploring for mining resources along **Nam Ma River** negatively impacts on the food sources of local villagers as their agricultural land is disturbed. Further, river and stream flow direction can be altered, and water pollution can impact on fish populations (especially the Nam Ma River) and on river weed (kai) available in many rivers. River weed is an important local source of food and income however these mining activities are heavily impacting on production and quality. This can have the effect of forcing villagers to turn to forest products mainly NTFPs and timber in order to meet to their family food and income requirements. Locals also commented that bathing in the Nam Ma River can sometimes lead to skin irritation.
- Exploration in **Xam Tai** District began in 2005 in the area of Phonexai, Ban hang, Ban Kang. Because the companies gained permission from the central government, the district officials do not know the details of the exploration and mining efforts. District officials believe the mining is causing health problems in these areas.
- Forest destruction due to exploration activities creates a more direct impact on forests in **Xam Tai** than in other districts. Locals observe that mining activities in **Viengxay, Sopbao, Aet** and **Xiengkhor** Districts do not heavily impact directly on forest land; however in these areas mining impacts on other local natural resources, and reduces agricultural production capacity and availability of food source of villagers. In these areas it is likely that villagers will rely more heavily on forest resources for livelihoods.
- Currently, a private Vietnamese company is proposing to conduct stone mining in **Houameaung**. If this business is approved it will supply a Vietnamese cement factory in Houaphan, to be located about six kilometers away from Xam Nuea town centre.

In the future, the provincial government plans to support 14 small scale mining projects which are under its assigned power to approve.

## Direct Driver 6: Hydropower development

Hydropower projects can lead to deforestation through direct impacts such as flooding of forested areas and infrastructure development (including access roads), and also through forest loss due to resettled villagers establishing new agricultural land in previously forested areas.

The authority to approve hydropower projects depends on the planned installed capacity of the project. A number of small hydropower projects, defined as projects with an installed capacity smaller than 15 MW, were identified in this study (Table 6). Limited information was available for these small hydropower schemes; however they are not likely to be a large driver for deforestation in Houaphan when compared to larger hydropower projects.

**Table 5 Small scale hydro-electric power projects in Houaphan**

Hydro-electric projects	Install Capacity (MW)	Hydro-electric projects	Install Capacity (MW)
Nam Vang	5	Nam Long	12
Nam Khan	15	Nam Et 4	19
Nam Hao	5.1	Nam Et 5	7.5
Nam Mone 1	7.3	Nam Et 6	1.8
Nam Mone 2	6.6	Nam Noua	2.1
Nam Yong	5	Nam Dik	15

Houaphan province contains a number of larger operating and planned hydropower projects, administered by the central or provincial authorities. Details of these hydropower projects, and their location and status, is specified in Table 7 and Table 8 below. The larger scale hydropower projects in Houaphan province are the Nam Sim, Nam Ma<sup>3</sup> 1, 2 & 3, the Nam Nern 1<sup>4</sup>, the Nam Nern 2, the Nam Sam 1 & 3, the Nam Et 1, 2 & 3, and the Nam Pern 2.

Additional details for a number of the larger hydropower projects established during this study are presented below:

**Nam Sim Hydropower Project.** The installed capacity of this project was reported by the deputy head of the Provincial Energy and Mining Department as 100 MW which is much higher than the information gained from other sources which often indicate a capacity of only 8 MW. The length of the canal of the project will be 500 meters, passing through village agricultural land.

**Nam Pern 2.** This project will use existing water flow pressure and will not require a reservoir. The installation of the machine head and road construction to the project site is under way, and will directly impact on rice paddy land. As reported by the province, the install capacity will be 7.3 MW, which is lower than the statistic reported from other sources (Table 7). Similarly, locals also indicated that the 22 MW Nam Pern 1 hydropower dam with a 22 km canal (in Houameaung) would be developed. Meanwhile, the province said that Nam Pern 1 is only a 9.2 MW project.

**Nam Haw Hydropower project.** With central government approval, a Chinese company Koaum Bolisat Loang Chaleurn is building the Nam Haw Hydropower project in Sopbao. The construction of this project began in 2013 with planned completion in 2018. The power house is installed in Viengxay District and its 12 km canal lies along the Nam Haw River, next to which is Road 6A. According to local officials, the project was approved before an EIA was conducted and the district has very little technical information about the project. This project is situated within the boundaries of Viengxay and Sopbao. Interviewees indicated that the project is already having negative impacts, such as reduced water flow, increased pollution, and impacts on food security.

---

<sup>3</sup> According to the Department of Public Work and Transportation, the Nam Ma 1 is located near Sophao Village, Sopbao District. Nam Ma 2 is located near Sopxaiy Village, Xiengkhor District, and the Nam Ma 3 is located near Nangern Village, Et District.

<sup>4</sup> Located south of Xam Neua

**Table 6 Houaphan hydropower specifications and details**

Dam Name	Catchment Area (km <sup>2</sup> )	Design flood (M <sup>3</sup> /sec)	Reservoir Area (km <sup>2</sup> )	Dam height (m)	Agricultural land inundated (ha)		Rated head (m)	Crest level (masl)	Crest length (m)	Crest width (m)	Full supply level (masl)	Assured/Installed capacity <sup>5</sup> (MW)	Voltage of transmission line (kv)	Length of transmission line (km)	Population displaced (household)
					Paddy rice land	Upland rice land									
Nam Sim	197		-	7				-	22	-	631	8	22	4.7	
Nam Ma 1		7,691	10,800				15.2					44			
Nam Ma 1A		7,496	10,260				14.5					39			
Nam Ma 2		6,954	8,830				12.2					30			
Nam Ma 2A		6,785	8,406				7.5					18			
Nam Ma 3		6,750	8,325				8					18			
Nan Nern 1	5,806		-	145				405	910	10	400	3 x 82	115	59	
Nam Nern 2	3,764		12	105				405	510	10	400	2 x 66	115	50	
Nam Sam 1	4,611		14.61	80	261.5	107.91		315	195		310	83	220	36+102	335
Nam Sam 3	2,510		10.53	120	107.91	33.2		597	360		595	196	220	36+102	103
Nam Et 1	3,186		14.1	98				384	590		380	93	115	50	
Nam Et 2	-		-	89				489	260		485	65	115	30	
Nam Pern	-		327	7				828	50		831	12	115	10	

<sup>5</sup> According to the province, the Nam Sim hydropower project's installed capacity is 5 MW (3 MW lower than other report which is mentioned above) and was 15% completed at the time the study was conducted (2014). Construction is expected to be completed in 2015.

**Table 7 Houaphan hydropower project location and status.**

Project Name	Location	Date of Approval	Implementer /Contractor	Status
Nam Sim	Viengxay	30 Jan 2009	Nam Sim-Power. Co., Ltd/Mecamidi	EIA done (no replacement of villagers and only 5.8 ha of paddy area would be affected)
Nam Ma 1, 2 & 3	Sopbao, Xiengkhor, Et		Linh Linh JFC Electrical Company (Vietnamese)	Cancelled by the province governor, based on the MoU of Nam Ma hydropower 1, 2 & 3 of Linh Linh JFC Electrical Company on No. 2158/PMO.MONRE, 05/12/2012.
Nam Nern 1	Between Xieng Kouang and Houaphan provincial border. district about 10 km.		Indochina Consulting. Co., Ltd	On the approval process. NN2 is inside the NPFA
Nam Nern 2	Korhing village, Houameuang			
Nam Sam 1 & 3	Xam Tai NS1:104°50'15.12" (E), 19°54'56" (N) NS3:104°30'41.63" (E), 20°8'59.04(N)	30 Mar 2008 (MOU) 19 Sep 2011 (PDA)	Saigon Investment Croup (SIG) Vietnamese company	
Nam Et 1, 2 & 3	Aet, Xam-Nuea and Sone <sup>6</sup> NE1: 20°43'50" (N) 103°56'15" (E), NE2: 20°32'30" (N) 103°49'06" (E) NE3: 20°31'59" (N) 103°38'53" (E)	10 Sep 2011 (MOU)	Partnership Electricity Houang Aeng Ya Lai Company (Vietnamese)	
Nam Pern 2	Pa Kung village, Houameuang			

<sup>6</sup> Nam Et 1 is located near Kang Village, Aet District; the Nam Et 2 is located near Houythoum zone, Xam Neua District; and the Nam Et 3 is located near Phoukamoun zone, Sone District.

**Nam Nern.** In Kouan, a Vietnamese company is investing in a hydropower project in Nam Nern. The project site is located about 50 km away from district centre of Kouan. The exact scale of the proposed project area is not known but the district was informed that the project reservoir area will inundated 6 villages: Sop Yuang, Kang Kho, Sop Kan, Sopsan, Phiengxieng and Phiengtart and they will have to relocate. Local government officials indicate that this project area includes forest area where there are still valuable wood species (teak and mai duu).

**The Nam Nern 2.** The Nam Nern 2 (NN2) Hydropower Project will be built in Houaphan province and the construction period is scheduled to be from early 2016 to early 2020. It will be over 5 km from the Korhing substation, according to a report from Vientiane Times Newspapers dated 28 August 2014. Local officials in Houameaung District however, indicated that project activities will only be 2 km from the substation. This project site covers eight villages located below the reservoir: Phiengdee, Son Kure, Kor Hing, Soplao, Hark Kai, Hoaumai, Namone and Lanxieng as their paddy rice land area will be flooded. There are also fears that this project will impact on the Nam Nern Night Safari Ecotourism site, its camps and adjacent national conservation forest area. The Nam Nern Night Safari Won the Prestigious World Responsible Travel Award For Best for Responsible Wildlife Experience At World Travel Mart, London in 2014. Current results of the feasibility study for the project shows that more further detailed studies on the social and environmental impact are required, and that these studies should be carried out in a more participatory way in order to ensure sustainable investment.

**Nam Aet 1, 2, & 3.** The company Hong Ngaeng Jia Lai is involved in Nam Aet (1, 2, & 3) hydropower projects in Aet District. It is a 25 year project concession, the operation of which is estimated to affect agricultural land of 10 villages, seven of which will have to relocate. In 2012, this project was cancelled because it was determined by the government as not worth supporting due to the anticipated adverse social and environmental impacts.

### *Potential additional future projects and feasibility studies*

In Houaphan, feasibility studies for hydro-electric power projects have been carried out in a number of rivers and many of these projects are within forested areas including NPFA (Table 13).

**Table 8 Hydropower project feasibility studies**

Project name	Investor	No of projects	Notes
Hong Ngaeng Jia Lai	Vietnamese	2	May require central government to approve.
Nam Xam 1 & Nam Xam 3	Lao	3	Projects in Xam Tai at Ban Tao, Ban Viengphan and Ban Na Xai (the survey includes the Nam Xam 2 district officials had hear that the project is financially not feasible).
(Not known)	Japanese	1	Project in Xam Tai at Nam Kaem at Na Vuen Village.

In Hiem District, local officials believe that the development of hydropower dams will take place inside the NEPL NPA buffer zone (ked kun zon), and controlled use zone including the following four areas: Tam La (2), Tat loum (1), and Tat Teu (1). The latter two are in Nam Kan River near Xieng Khouang province. The Nam Hang River is another potential source of hydropower

development and some studies and proposals for hydropower projects are currently underway. Local officials indicate that development activities have been carried out in this area over the past 5 years.

Government officials participate in social / environmental assessment processes, however they indicated that they thought they did not have sufficient technical knowledge to perform this job adequately, especially with relation to tradeoffs between economic considerations and social and environmental impacts.

### **Direct Driver 7: Infrastructure development**

The primary causes of deforestation and forest degradation that fall under infrastructure development are electricity distribution lines, and road development. Both causes will lead to direct deforestation, with additional deforestation and degradation being caused by the improved access to areas that were previously harder to access. The infrastructure developed as part of the Xam Neua Special Economic Zone will be considered under direct driver 9: Urban Expansion.

#### Electricity distribution

Installation of high voltage electrical distribution lines usually requires clearing in forest areas and can also impact on rice paddy production areas. Transmission line establishment and maintenance can require significant forest land clearance. Depending on the specific location and requirements, the size of an electric-transmission pole base can be 6 x 4 – 6 x 6 meters, and the distance from one pole to the next are between 50 meters to 80 meters. Details of electrical distribution projects are specified in Table 14 and Table 15.

**Table 9 Electric distribution projects in Houaphan province**

No	Implementers	Area	Capacity (Kv)	Length (km)	Project Cost		Project Duration	Comple- tion
					billion (kip)	million (\$)		
1.	CERIECO-HEPEC Consulting	Phonsavan-Sam Nuea				30.4		100%
2.	Douangthavone Electricity Company	XamTai-Kuan	22 0.4	28 26	22		2012-014	On- going
3.	Phousi Construction and Electricity Instalment	Houamouang-Xam-Nue-Viengxay-Sopbao-Aet-Xam-Tai	22 & 35 0.4	333 87	129.6		2012-2016	7.6%
4.		Sang Lek Hok - Nongkang and XamNue	30 0.4	22 7	23.4		Since 2011	100%
5.	Houngvilai Construction and Electricity Company	Ban Mouangpan-Ban Na Chong and Ta Ean in Viengxai	20 0.4	22 3	9		2012-2014	28 %
6.		Rural Area in Viengthog and Pa Tee	22 0.4	369 130	188.2		2010-2013	73%
7.	TVS Construction and Electricity Company	Sopbao-Xiengkhor-Aet	35 0.4	111 48	54.9		2010-2013	90%
8.	Pon Sak Da Construction and Electricity Company	Houamouang, Sopbao, Aet (33 villages)	22 0.4	216 27	57.2		2012-2015	12%
9.	Phetlaiphone Group Company	XamTai-Kuan	22 0.4	155 34	87		2013-2016	15%
10.	Thippomvong Electricity Company	Dan Phao and Sop Thong (10 villages in Viengxai)	22 0.4	35 5	17.1		2012-2015	52% e
11.		Vanghue in XamNue	22 0.4	931 5	1		2012-2013	30%
12.	Souksengduen Electricity Company	Mongnam and Houymone (10 village in Xiengkhor)	35 0.4	40 11	22.7		2012-2014	16%
13.	Phetlaiphone Group Company	Phanngam, Xiengban (Xam-Tai), Mouangna (Kouan)	22 0.4	83 24	34.7		since 2012	On- going
14.	Phetlaivanh Company	Van and Houyko (Xam-Nuea)	22 0.4	154 42	67.4		since 2011	100%
15.	Soulivong Electricity Company	Houayyong, Houaylom (Aet)	35 0.4	9 3	4		since 2011	100%
16.	Lao Electricity Company	Nam Souy Border crossing (Viengxai)-Xam-Tai-Xam-Nuea-Vienthong	22	267		11		100%

Source: Adapted from Houaphan E & M, Five Year Social-Economic Development Report (2011-2015) and Plan (2016-2020)

**Table 10 A plan for installation of electric-transmission lines in Houaphan Province**

District*	Kilovolts (Kv)		Length (km)		Village (number)	Village (Name)	Impact on
	Max	Min	Max	Min			No of Family
<b>XN</b>	22	0.4	29.94	4.63	6	Sa Naen, Sa Nord, Phou Chaeng (Sam Nuea); Houy Kok and Nong Top, Pha Keo (Aet)	234
	22	0.4	36.437	7.75	8	Houy Yong, Khod, Paen, Na Phieng, Houy Sard, Keo Kouang, Na Xeng, Nam Koup	337
<b>VX</b>	22	0.4	39.475	6.42	7	Cha Khien, Fad, Bor Pha, Na Ham, Kham Nang, Hin Dam, Dan Thong	339
<b>SB</b>	22	0.4	19.15	9.04	3	Na Kham Hang, Tad, and Na	87
<b>XK</b>	22		29.25		5	Houy Pid, Thaen San, Sop Pin, Sop Doung, and Phieng Xang	
<b>HM</b>	22	0.4	36.55	3.42	4	Pa Cha, Phieng Hom, Pha Sew, and Phieng Xang	124
<b>AT</b>	35	0.4	24.795	8.13	5	Houy Puak, Houy Fork, Houy Mor, Ta Mo, and Houy Vaek	277
*Xam Neua (XN), Viengxay (VX), Sopbao (SB), Xiengkhor (XK), Houameaung (HM), Aet (ET)							

## Roads



**Figure 12 Road development associated with the NKSEZ (photo: Sebastian Koch)**

New road construction is a particularly important driver of forest degradation and deforestation. In addition to the direct impact of forest clearing, they can also support a great number of other, significant drivers for forest loss and degradation. For example, new road construction can lead to:

- Easier access and incursion of people into previously hard to access areas leading to logging, NTFP collection, pioneering shifting cultivation, and hunting
- Access to areas for illegal mining activities
- Increased incidence of forest fires
- Invasion of weed and pest species
- Edge effects
- Hydrological impacts for example changes to local conditions such as increased water logging, and
- Increased logging as road building companies can be compensated through logging quotas, both along the road and in other areas.

In Houaphan province many villages are accessible only in dry season, and even when usable the condition of the roads can be poor. This inaccessibility makes it difficult to take part in cash cropping as traders do not pass by the villages, and transporting produce can be difficult and expensive. Poor accessibility also restricts access for GoL organizations to conduct village development activities. To improve accessibility the government supports small and large scale road developments and road improvement in order to create better national and international links.

Some small scale roads from the district to villages are currently under construction/improvement and they are mainly financed through the Poverty Reduction Fund (PRF) and constructed by Lao companies.

Villagers in many areas enter into agreement with maize buyers to fund improved access roads for maize growing areas. These arrangements usually involve 2+3 farming business contracts with private businesses. In the contract, villagers grow corn to sell to maize buyers, who in turn finance the up-front costs of road building. Villagers then pay back the cost of the road when their corn is sold to the business at an agreed price.

Large scale road projects are under central government control, and local governmental officials often know little about these projects. There are often agreements between local Lao companies and the central Government of Laos to build larger scale roads. Often, the government provides a logging quota for the private construction company in return for building the road, in lieu of paying cash directly to the company.

In practice, companies sometimes cut much larger areas than are required for road building to either cover their costs or increase profit. Without effective monitoring this can be a significant source of forest loss over and above what is required to build the road. The road construction projects in Sone, Hiem, Aet, Xam-Tai, Xam Nuea and Kouan Districts which are under construction are financed through these types of arrangements.

In terms of these road investments, the local Lao business, Saengthong Construction Company, seems to be the most influential in the province. It was allocated more than 800 cubic meters of logging quota by the central government as a road construction cost from Xam-Tai to Kouan District and the road along the Vietnamese border (through forest area) in Kouan District (see Table 12 and Table 13).

A road along the Vietnamese border, from Aet District centre to Viengxay and from Nam Tai to Phieng Pho, about 200 km long, is being built and many locals are worried that the road will also support (illegal) logging. According to the province, some roads (Table 14) will be built and improved and it is possible that the government will allocate more logging quotas to cover the cost.

**Table 11 Roads under construction identified during interviews with officials**

Location		Length (km)	Construction cost
from	to		
Hiem	Phonsavan (Xieng Kouang)	-	30 billion kips
	Sone town centre	-	-
Sone	Phonthong (LP)	70	-
	Xam Nuea	120	-
	Sopkok	71	-
Xam Tai	Vietnam	44	-
	Vietnam	95	\$US 80,000
	Kouan <sup>7</sup>	44	\$US 2 billion
Kouan	Vietnam	35	-
	Piengpho (Nonghaed)	-	-

Source: Interviews

**Table 12 Roads under construction**

Name of the project	Location	Length (km)	Width (m)
1. Road No 32417	Xamtai-Koaun	33.90	7
2. Xam-Nue District centre – Nongkang airport	Xam Nuea	32	9
3. Nongkang-Aet	Xam Nuea-Xiengkhor-Aet	28	6.50
4. Nongkang-Hanglong 3 junctions	Xam Nuea-Viengxay	35	7
5. Poonghai-Tamla	Hiem	31.35	5.50
6. Loongku-phonthong	Viengxay	36	4.50
7. Viengxay District centre-Ban Na Loaung-Ban Ang Sung – Ban Pa Jai	Viengxay-Xam Nuea	48	5.50
8. Ban Houaxieng -Phatee	Xam Nuea	45	6
9. Ban Sopsan-Ban Na Deed (Vietnamese border)	Xiengkhor	21.45	7
10. Ban Soplong-Ban Nam Bong	Sopbao-Xiengkhor	22	7
11. Ban Nam Souy-Ban Souy	Viengxay	13.70	7
12. Ban Sone Tai-LengBang (Vietnamese border)	Sone	61	5.50
13. Ban Na Loaung-Ban Yair	Viengxay	20.50	5.50
14. Ban Yair-Ban Chard	Viengxay	19.20	5.50
15. Ban Na Man – Ban Khamnang	Viengxay	23.40	4.40
16. Ban Phoonmai-Ban Na Man	Viengxay	10	4.50

Source: Transportation Department of Houaphan (2014)

**Table 13 Road construction / Improvement plan**

Road Name	Location	Length (km)	Remark
1. 6A	Hanglong–SopBao–Xiengkhor–Aet–B. Darn	123	
	Xiengkheuang Vietnam.		
2. 6B	Sopbao – Pahang	26	
3. 6	Phoulao – Xam Neua – Viengxay – Nameo	119	Old road
4. Others	Mainly in Xam Neua, Nongkhang, Viengthong – Laengbaeng (Vietnamese border), Xamtai – Thanlao, Soplao – Sopern, and Xamtai – Kouan	285	

Source: Transportation Department of Houaphan (2014)

## Direct Driver 8: Fire

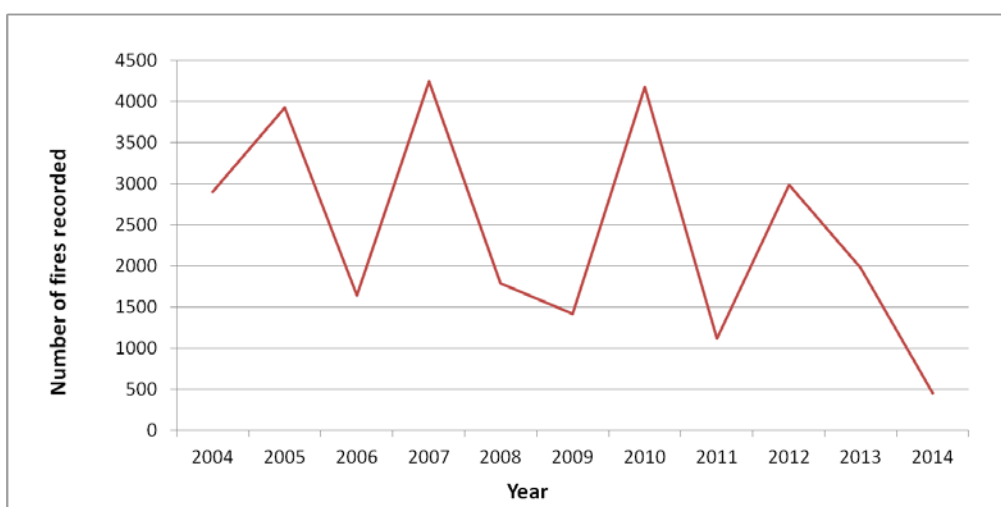


**Image 5 Using fire in rotational cropping (photo: Sebastian Koch)**

Fire can drive deforestation and degradation in a number of ways, including:

- intentional use of fire in shifting cultivation
- intentional setting of fires for hunting and grazing purposes
- the escape of fires into areas adjacent to burned areas
- uncontrolled fires started by lightning strikes and setting by people

Patterns in fire occurrence in Houaphan between the years of 2004 and 2014 was determined using the Fire Information for Resource Management Systems (FIRMS) developed by the University of Maryland and NASA using MODIS hotspot data (Figure 13). This data illustrates a highly variable year to year fire occurrence pattern.



**Figure 13. Fires recorded by year in Houaphan as determined by analysis of MODIS data.**

Provincial and District Governments also keep records of reported fires. Reported forest fire occurred in 12 areas, estimated to be around 144 ha in four districts In Houaphan between 2013 and 2014 (Table 15). This statistics, however, do not differentiate between forest area that was burning due to shifting cultivation, hunting and grazing purpose, and is not reflective of the total areas of forest and fallow burned.

**Table 14      Reported statistics on forest fire in four districts in Houaphan, 2013-2014**

<b>Houameaung</b>		<b>Area (ha)</b>
1.	Chet Hay Koi Mooing San Phot Tan Phi      ເຂດຫ້ວຍກໍ່ມວງສັນພູແທນພ້າ	13
2.	Chet Baum Nong in front of district centre      ເຂດບວມໜອງຕໍ່ໜ້າເທດສະບານເມືອງຫົວເມືອງ	6,5
3.	Chet Hay Laeng and Jik Jor Lor Ban Nam Pong      ເຂດຫ້ວຍແລ້ງ ແລະ ຈິກຈໍ່ຫຼໍ່ ບ້ານນ້ຳປ້ອງ	23
4.	Khet San Phou Phay and San Nong Eung Ban Maung pern      ເຂດສັນພູຝາຍ ແລະ ສັນໜອງອີງ ບ້ານເມືອງເປີນ	24
5.	Khet Kao Kouay Ban Korhing      ເຂດສັນແກ້ວຄວາຍ ບ້ານກໍ່ຮຶ້ງ	18
6.	Khet Pha Ka and Ban Dong border      ເຂດແດນບ້ານ ປ່າຄາ ແລະ ບ້ານ ດົງ	20
<b>Aet</b>		<b>Area (ha)</b>
7.	Khet Ban Na      ເຂດບ້ານ ນາ	9
8.	Khet Aet District      ເຂດບ້ານ ເມືອງແອດ	6
9.	Khet Ban Naha      ເຂດບ້ານ ນາຮ້າ	5
10.	Khet Ban Kok      ເຂດບ້ານ ກອກ	3
<b>Sopbao</b>		<b>Area (ha)</b>
11.	Khet Hauybao, Sopbao village      ເຂດຫ້ວຍເບົາ ບ້ານສິບເບົາ	2
<b>Hiem</b>		<b>Area (ha)</b>
12.	Phoukoud and Sone District border (NEPL NPFA)      ເຂດປ່າສະຫງວນແຫ່ງຊາດນ້ຳແອດ-ພູເລີຍ ລະຫວ່າງຊາຍແດນເມືອງພູກຸດ -ເມືອງຊ່ອນ	15
<b>Total:</b>		<b>144,5</b>

Source: Adapted from PoNRE report on fire (2014)

### Shifting cultivation

Fire is used as a tool in shifting cultivation as a means to clear vegetation after it has been slash and left to dry for several weeks to months. This traditional method can be used to clear areas easily, and can increase soil fertility in some instances. Secondary or primary forest is cut and left to dry during the dry season, before being burned prior to the commencement of the wet season in April / May.

### Hunting and grazing

Fire is also used as part of traditional wildlife hunting methods. Grazing is another reason for setting fires, as fire is used to maintain grazing areas, and to produce fresh green growth for grazing animals.

### Escaped wildfires

Intentional fires can often escape into adjacent flammable areas of forest. Deciduous forests in Houaphan can be flammable in the dry season, especially if they have increased fuels loads, for example, from dead bamboo. The seasonal nature of the climate and forests, and the high incidence of fuel loads due to bamboo abundance for example, can lead to fire prone forest areas.

### Fires set randomly and caused by lightening

People sometimes start fires for no apparent reason other than that the area has a high fuel load and will burn. Lightening can also start fires in remote areas.

Overwhelmingly however, it is the use of fire in shifting cultivation that is the primary means by which fire is a driver of deforestation and forest degradation.

### Fire prevention activities

While most fires in Houaphan are likely to be intentionally set and managed as part of agricultural practices, escaped and unintentional forest are likely to contribute to deforestation and forest degradation. Poor fire management and the inability to extinguish unintentional fires is also therefore potentially a significant driver of deforestation and forest degradation.

Local government creates fire prevention committees which officials say should ideally visit the villages and introduce effective fire prevention techniques. This activity should take place each year in February, prior to the beginning of the burning season. In practice, the province cannot go to the field due to insufficient resources and budgets. As an alternative, PONRE sends a letter to each district to inform them about fire prevention techniques. However some district staff, mainly from DAFO and DONRE, do go to villages carrying with them the fire prevention message and also demonstrating fire protection techniques to villagers. This activity is carried out only in villages that are considered high fire risk. As forest fires can also be a cross boundary issue, villages and governmental authorities in Sopbao, Xiengkhor, and Xamtai, and some groups from adjacent areas in Vietnam work together on forest fire protection. POFI has also conducted training in Xamtai.

In Sopbao District, villages that share a border with Vietnam get financial and technical support from Vietnam for forest fire prevention. Representatives from Lao villages are invited to attend the annual fire protection event held in Vietnam. With Vietnamese support, the fire prevention event is sometimes held on the Lao side of the border. This is an agreement between local government and between Lao and Vietnamese villages to reduce or stop forest destruction caused by fire. Additionally, POFI has a cross border agreement with Tanh Hoa, and intends to sign another with Son La in March 2015. All districts cooperate and conduct joint forest fire prevention trainings

An example of a large uncontrolled fire occurred in Sopbao in 2011. Between 3000-4000 ha of forests was burned. Villagers used tree branches to fight the fire, and called district offices for assistance. Government staff that attended the fire were not highly effective due to a lack of equipment and training on fire fighting.

## **Direct Driver 9: Urban expansion.**

Two activities are considered specifically under the urban expansion direct driver. These are the development of the Nong Kang Special Economic Zone (NKSEZ), and the establishment of new administrative districts.

### ***Nong Kang Special Economic Zone***

The Prime Minister of Laos issued the Decree on Special Economic Zone dated 26/10/2010 as the framework for the promotion of Special Economic Zones (SEZs) (Khatthiya 2011). A primary aim of SEZ development is to create the conditions necessary for local and foreign direct investment.

The NKSEZ was proposed by a Vietnamese company and is approved by the central and province governmental levels. In the plan, a 70 km road from NKSEZ to Aet District and Xiengkoang will be completed in 2015. Upon the completion of the project, 30 metre-long-trucks will be using the road to carry construction materials from Vietnam to further develop of other planned zones of approximately 28,000 ha including an airport area and about 100 ha of cattle grazing area.

A new airport is being built by a Vietnamese Company (Hong Eng Jerline Network) as part of the NKSEZ. The project area covers 450 x 5800 metres of land area where there is estimated to be 13,000 cubic metres of logs. This land area includes villagers' agricultural land: 107 ha of paddy, 5220 trees of planted mark kao (*Jatropha*), 69 fish ponds and some local villages who will have to be relocated.

The NKSEZ may lead to some direct deforestation, and will likely be a future indirect driver for forest degradation and deforestation due to changes in access to areas, and economic development. The location of the Nong Kang Special Economic Zone (NKSEZ) is indicated in Figure 7, and the specific zoning is displayed in Figure 15.

### ***New administrative Districts***

The development of new administrative districts can lead to urban expansion as new services are introduced and require support staff. This includes the building of schools, government offices, accommodation and new roads.

In May 2012, Kouan was developed as a new district, being separated from Xam-Tai, which is about 35 km away. This new district development requires logging as wood is required for infrastructure development, accommodation, offices, school buildings and furniture, and forest needs to be cleared for road development.

Similar to Kouan, Sone was developed as a new district in January 2014. In this district, the Vietnamese owned Chitchalearn Construction Company, was granted the concession to develop all district infrastructure including roads, schools, accommodation and office buildings with an estimated value of 1,200,000 USD. The company paid for these upfront, and will be repaid by the government, potentially with a timber concession.

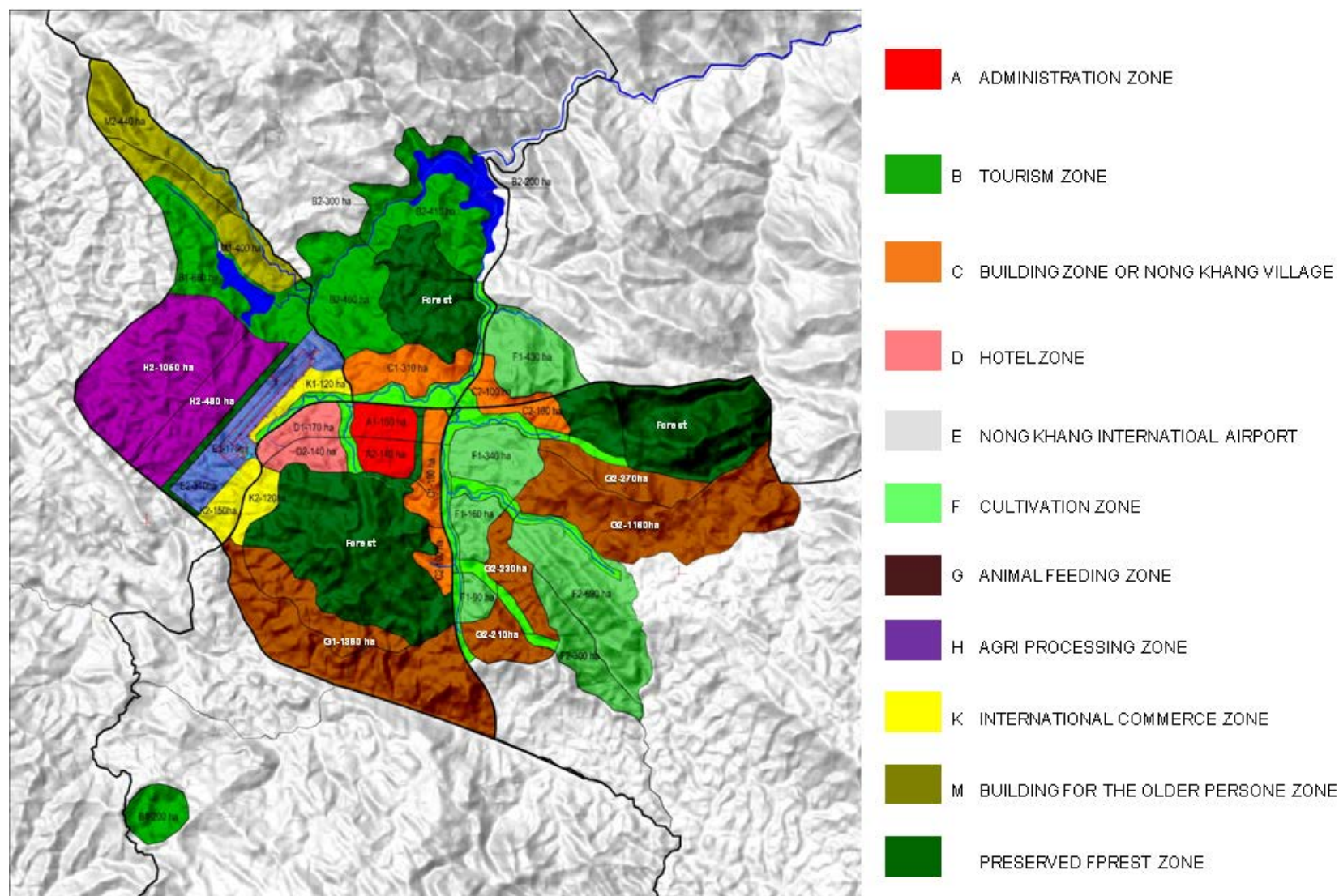


Figure 14 Map of the Zoning Board for the Nong Khang SEZ (2013 - 2030).

## 8. INDIRECT DRIVERS

There are 8 indirect drivers identified in this study. These are the underlying causes that contribute to the direct drivers.

1. Poverty
2. Population Growth
3. International demand for commodities
4. Village relocations
5. Border crossings (formal and informal)
6. Lack of effective law enforcement
7. Deficient Participatory Land Use Planning (PLUP) implementation
8. Inadequate boundary demarcation and limited management capacity

### 1. Poverty

Poverty can be an underlying cause for many of the direct and indirect drivers of forest degradation and deforestation.

Houaphan has shown significant progress towards poverty reduction. As shown in the Table 16, the government announced that 120 villages have moved out of poverty during the three year period, 2011 -2014. During this time, 14,334 families are recorded as shifting from poor to developed status.

**Table 15 Results of a poverty assessment in Houaphan Province 2011-2014**

	2011	2014
Districts	8	10
Village clusters	91	91
Villages	720	717
Families	45,573	47,048
Poor districts	7	6
Poor villages	520	400
Poor families	22,757	14,334
Developed villages	8	140
Developed families	6,633	22,269

Source: Social and Economic Development Report of Houaphan (2014)

According to interviewed local officials, being officially classified as not poor does not necessarily lead to reduced deforestation and degradation by households. In reality, residents in the province observe that people in many parts of the country as well as in the world enjoy better living conditions than what they do, and this observation shapes local people's expectations of an improved living standard.

To meet this expectation, most families in the province try to earn money to build better houses, to support their children to receive a higher educational level and to own items including cars, tractors, motorbikes, trucks, and cell phones. Many families (especially in town) also decorate their houses with (expensive) wooden furniture, often made of valuable tree like Mai Long Leng, which provides demand for further logging. Forest resources can also be used unsustainably to increase incomes. For example, farmers use more land area to cultivate agricultural cash crops

to meet their demand for more income, leading to greater deforestation and unsustainable land use practices.

Local governmental officials at the province and district level use the phrase, “it is better die tomorrow than today”. This means that they know the future impact of destroying forest on people and environment but they also understand that local people have to rely on the forest resource mainly trees to meet their immediate needs.

Many local officials strongly believe that solving the problems of deforestation and forest degradation cannot be achieved until food security and reasonable incomes are provided for people living near forest areas. Until these issues are addressed, forest clearance for food and cash crop production will continue. For this reason many government officials are reluctant to enforce regulations regarding timber logging for house construction, and shifting cultivation. On top of this ‘blind eye’ to illegal activities, many officials benefit directly from these activities as well, and are therefore reluctant to stop or address these issues if their income will reduce as a result.

## 2. Population Growth

Increasing populations, like poverty, can be an underlying cause for multiple direct drivers, and other indirect drivers for deforestation and degradation. Together with poverty and increased lifestyle expectations, population increases will place increased pressure on natural resources

The number of inhabitants in Houaphan has been increasing from 290,241 in 2011 to 294,907 in 2013 (Table 17). This population growth may also be related to increased levels of poverty and with increased demand for arable land. In Houameuang, the wish to have large families and limited family planning is leading to increased populations.

On the other hand, officials in Kouan said that family size in villages in this district has reduced due to the introduction of an official birth control program. There is also out-migration as young people move to Vientiane to study and do not return home when their studies are completed. However this out-migration is not necessarily leading to reduced forest impacts, as many students rely on their parents to pay for their school fees, accommodation, materials and day to day living costs. Families need more money to support these students, and this creates the need to earn more income from available land and forest products.

**Table 16 Population statistics -Houaphan 2011-2013**

District Name	2011		2012		2013	
	Total	Women	Total	Women	Total	Women
Sam Nuea	56,426	27,655	57,815	28,411	58,224	28,395
Xiengkhor	26,478	12,889	25,945	12,691	26,639	13,019
Viengthong	27,230	16,632	27,727	13,753	12,791	6,344
Viengxay	33,101	16,281	33,166	16,408	32,910	16,044
Houameuang	31,881	15,674	32,045	15,884	32,627	16,292
Xamtai	61,879	30,617	36,831	18,179	38,311	18,953
Sopbao	26,240	12,875	25,624	12,771	25,852	12,755
Aet	27,006	13,182	27,472	13,316	27,295	13,439

Kouan	24,848	12,324	24,345	12,074
Sone			15,913	7,939
Total:	<b>290,241</b>	<b>145,805</b>	<b>291,473</b>	<b>143,737</b>
			<b>294,907</b>	<b>145,254</b>

Source: Province Planning and Investment Office 2014

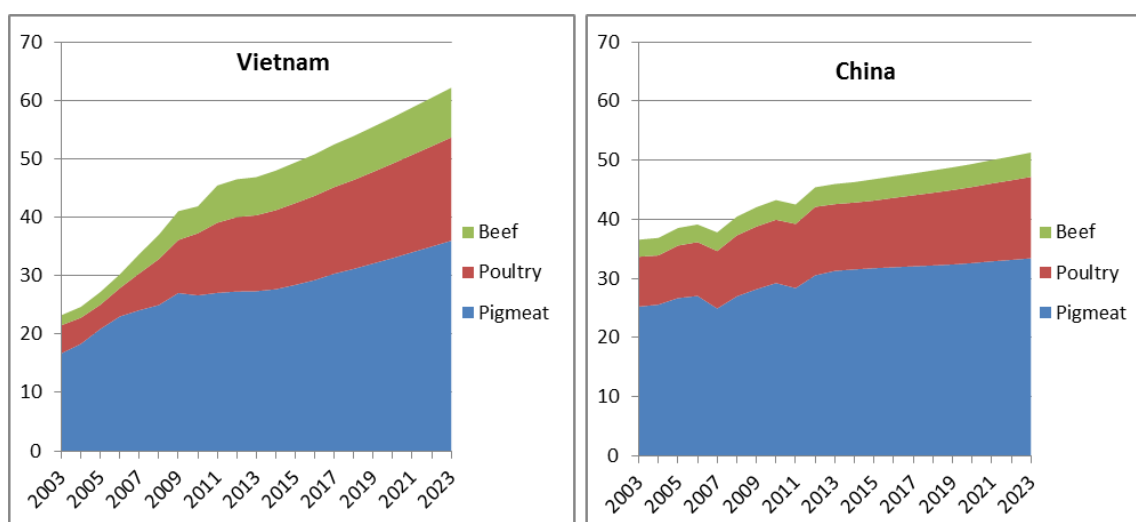
In addition to increasing demand for natural resources such as timber and agricultural land, growing and developing populations will also increase the demand for electricity, and for rural electrification. According to a report from the Energy and Mining Office of Houaphan (2014), about 377 villages (52.6% of total villages) or 28, 268 households (60.6% of total households) in the province had gained access to electricity in 2013.

The Social and Economic Development Plan (2016-2020) report estimates that Houaphan would have 638 villages consisting of 43,247 households by 2020. Further, the report indicated that in the five years from 2016, the provincial demand for electricity will increase from 29,958,876 KW/h to 38,579,372 KW/h, and the province expects that 89.106% of the total villages or 92.768% of the total households will have electricity connected. This may lead to increased deforestation and degradation through the building of transmission lines, and through increased requirements for power stations, however local power use is small when compared to exported electricity levels and is unlikely to be a large driver itself.

### 3. International demand for commodities

International demand for commodities, specifically maize, timber, and some NTFPs is an underlying driver for deforestation in Houaphan.

Nearly all the **maize** that has been produced in Houaphan over the past decade has been exported to Vietnam as animal feed stock (EMC 2015). This feed is primarily fed to pigs, as demand for pork has been increasing in both China and Vietnam (Figure 16).



**Figure 15 Annual meat consumption per capita (kg) Vietnam and China (Source EMC 2015 using Dataset: OECD-FAO Agricultural Outlook 2014-2023).**

The increasing meat consumption is leading to a shift towards industrial farming practices, a production method that uses manufactured feeds more than traditional animal rearing methods

(EMC 2015). It is likely that the demand for maize, depending on the price of alternative feed stocks to maize, such as wheat, will increase over the coming years.

There is a large market and demand for hardwood **timber** in Vietnam and China, especially for furniture making. In fact trade data suggests that the majority of wood based products are logs and sawn wood, which are predominantly exported to Vietnam, China, and Thailand (Saunders 2014). Much of this demand, especially for the Vietnam market, is supplied with illegally logged timber from Laos, especially in areas near to the border. As mentioned above, it is estimated that more than half, and possibly up to 90% of the total wood harvested in Laos is illegal, and therefore not documented (Saunders 2014).

The demand for some **NTFPs** from international markets may also be leading to forest degradation. For example, the majority of red mushrooms collected are destined for Vietnam and China, and interviews revealed that the collection of red mushroom has increased significantly in recent years.

#### 4. Village relocations

Many villages in Houaphan are located near or inside forest areas. In fact, some villages (see Table 22) were located inside the Nam Xam NPFA and NEPL NPFA before these areas were declared and boundaries assigned. Farmers in these areas mostly produce rice and maize using shifting cultivation. While villagers claim traditional use rights to these areas, the government has relocated some of these villages to areas outside the protected areas, often near existing towns.

**Table 17 Villages living inside NPFA**

District	Villages	Notes
Xam Tai	Ban Dan Xang	bordering Xam Tai District in proximity to the Nam Xam National Protected Area (NPA)
Sone	Sobka (Lao) Meuangyued (Lao) Houyma (Hmong)	living inside and near the NEPL NPFA
Hiem	Thirteen villages	inside NEPL NPFA

The government provides a level of support to members of resettled villagers including transportation costs, roofing, rice, and allocated land. Other advantages of resettlement promoted by the government are the improved access to services, either through better access, or through the better provision of these services in larger communities. For example, larger and newer villages often have better access to water, electricity, education, roads and transport, and health care services.

However there is often insufficient agricultural land in the new village area, especially if the village is being merged with an existing one. In such cases there may no longer be enough land for food production and incomes for neither the existing or resettled villagers. For example, Ban Huysa (in Hiem) was moved from Nam Hang to live near to district centre and each family was allocated only 0.28 m<sup>2</sup> of land. District officials understand that more land is needed for the

villagers in Ban Huysa to grow enough food, especially for family consumption. This pressure for agricultural land near growing villages is likely to lead to pioneering shifting cultivation in forested areas.

Some villagers return to their old village areas (for example, Ban Pak Dop in Xam Nuea) when the support they receive is not adequate, newly allocated land is not adequate or sufficiently productive, or they have difficulty producing enough food or income. Insufficient land for resettled villagers can lead to many families returning to their original village areas, often making and expanding camps known as Sanams. Villagers often stay in these Sanams for the cultivation season and these areas can also be used to graze cows. Older people and children who go to school usually remain in the new village area. The expansion of these sanams may lead to deforestation and forest degradation as grazing areas in previously forested areas are increased in size, and through increased forest disturbance due to the increased number of people living in these areas collecting a range of NTFPs and timber.

## **5. Border crossing (formal and informal)**

Cross border trade increases or provides the demand for many agricultural commodities. The presence of a large international market therefore acts as a significant driver for deforestation through the process of indirectly promoting agricultural expansion. Illegal cross border trade of agricultural commodities and forest products can further drive forest clearing and degradation, as it adds to the demand for commodities, and undermines attempts to regulate forest products and commodities sustainably.

Houaphan shares borders with Vietnam to the north, the south and the east, and there are many traditional, non-official border crossings. The only legal border crossing is Nam Soauy–Na Meo (See Table 23).

At the legal international border crossing (locally called Dan Na Meo), there is a team comprising governmental representatives from province transportation, the police, the tax office, DAFO (crop diseases control), the migration office (control in-migrants), and the health sector (control food for health). This team is on duty for 24 hours a day.

Depending on a range of local conditions, governmental officials from the province and district are also based at the traditional informal borders, fulfilling similar roles to those at the legal border crossing. In Sone, Sopbao, and Xam Tai Districts, agriculturally cultivated crops, primarily corn, timber (logs) and NTFPs are exported to Vietnam through these traditional borders. However this can occur at all hours of the day and officials are concerned that there are no strict controls over many illegal activities including transport of corn and timber.

The government is planning to upgrade traditional border crossings at Ban Phahang (in Sopbao District) and Nam Laeng (which is about 70 km from Sone District town centre) to become official international border check points.

**Table 18 A list of local traditional and legal international border crossings in Houaphan province**

Districts	Villages (Ban)	Traditional borders	Remarks
Viengxay	Ban Nam Souy (ບ້ານນ້ຳໂສຍ)	Dan Nam Souy	Legal border
	Ban Bor (ບ້ານ ບໍ່)	Dan Bor	
Xam Tai	Ban Thalao (ບ້ານ ທ່າເລົ້າ)	Dan Thalao	Traditional border
	Ban Nam Tai (ບ້ານ ນ້ຳໄຕ່)	Dan Nam Tai	
Sopbao	Ban Phahang (ບ້ານ ປ່າຮ່າງ)	Dan Phahang	
	Ban Sophao (ບ້ານ ສົບຮາວ)	Dan Sophao	
Xiengkhor	Ban Mong Nam (ບ້ານ ມອງນ້ຳ)	Dan Mong Nam	
	Ban Soploun (ບ້ານ ສົບລຸ້ງ)	Dan Soploun	
Aet	Ban Dan (ບ້ານ ດ່ານ)	Dan Ban Dan	
Sone	Ban Nam Laeng (ບ້ານ ນ້ຳແລ້ງ)	Ban Nam Laeng	

## 6. Lack of effective law enforcement

Many of the drivers for deforestation and forest degradation covered in this report are facilitated, or exacerbated, by insufficient or absent enforcement of existing rules and laws related to forest land use.

### Forest clearing

While many areas of forest have various levels of legal protection, deforestation in these areas continues for a number of reasons. In many areas villagers encroach onto forest land illegally to increase rice production for food consumption, and to grow agricultural cash crops, primarily maize, to increase income. The motivations for clearing land range from insufficient lands for poorer farmers to produce enough food for the year, through to larger scale agricultural ventures aimed at making profits. Regardless of these motivations and requirements of both villagers and law enforcement agencies, there is a general lack of law enforcement of protected forest areas.

### Conflicting policies

An added complication is that of conflicting government policies and support. For example, the central government has a stated policy of returning forest cover to 70% of total land area by the year 2020, including through tree planting. Districts however, promote and support food security through extension and the support of trading which can lead to increased forest clearing for agricultural land. Locking up land in forest plantations can lead to farmers clearing land in other areas, a process known as 'leakage'. Exacerbating this problem is the lack of marketing support to villagers which leads to low agricultural commodity prices being paid to farmers. To make enough money, farmers need to plant larger areas of land than they would need to if they were paid better prices. Higher commodity prices may not necessarily lead to reduced forest clearance, however improved incomes may reduce the pressure for many families to clear more difficult to cultivate or marginal forest areas.

### Under resourcing and changing responsibilities

An additional problem is one of inadequate resources for local government to carry out development responsibilities. The costs of hiring more staff, building offices and purchasing equipment is often paid for through timber quotas.

Officials also indicated that DONRE is currently in a transition period in terms of responsibilities. Staff are waiting to carry out their newly assigned roles, but these roles and how to exercise them are still unclear to many, especially those in new positions. DAFO staff are concerned that this transition stage is allowing illegal logging to occur.

## **7. PLUP implementation and land allocation**

There are concerns that many PLUP information gathering processes do not adequately record and document traditional / customary use rules of village forest land. This can lead to PLUP plans and forest management rules which do not take these traditional rules into full consideration, therefore reducing the likelihood that the forest use rules will be followed by all villagers.

Effective PLUP requires adequate time, financial resources, and staff capacity, and these are often limited within implementing agencies and projects. Lack of resources can lead to inadequate participation from all sections of the village, as well as district and provincial authorities. PLUP process and associated land and resource use plans that are developed in this resource limited context may lead to decreased effectiveness, and lost opportunities in terms of reduced pressure on forest resources.

Some government officials indicated that another obstacle for PLUP implementation is unclear demarcation of agreed use areas. PLUP plans also sometimes provide for increasing agricultural land leading to forest loss, and there is often little follow up to determine if plans are being followed. There is also often a lack of village development support in terms agricultural production techniques and market links. In some PLUP villages, villagers still clear prohibited forest areas and use the land to grow agricultural crops because land officially allocated for them is insufficient.

Where boundaries and use rules are clear, and enough resources and follow up support is provided, PLUP can lead to effective village land use and forest management. For example, in Sopbao Village, local villagers are confident investing in the land they are allocated to use for agriculture, while not expanding into forest land.

Land allocation can also lead to increasing pressure for land areas due to the sale of land that can be traded once the official land allocation and titling process is completed. For example, paddy land that has been officially allocated can be traded under some title arrangements. This can lead to a reduction in the area of productive land available to villagers, if the land is sold to outside interests, and the new owners are reluctant to rent their land to families that do not have sufficient land to produce rice. This can in turn lead to increasing pressure on forested areas as farmers look to upland areas for produce rice.

## 8. Inadequate boundary demarcation and limited management capacity

Unclear boundaries between different areas, such as boundaries between protected and non protected forest areas, and boundaries between different villages, can lead to illegal logging. For example, a concessionary logger may believe they are logging in the correct area but may in fact have entered into an area not intended to be logged, or a disputed area between villages may be logged in the belief that it is better to take the timber immediately rather than losing the resource to the neighboring village. Unclear boundaries can make effective resource management very difficult, because it is unclear who has responsibility and the benefits from the resource in dispute.

### **Box 3 Unclear district / province boundaries leading to forest degradation**

Unclear forest boundaries often lead to an overlap of ownership claims over the forest, and in these circumstances it is difficult to control illegal logging. In Hiem District, for example, part of the forest land is claimed by a district in Xieng Kouang as their land and trees are taken away illegally. Locals have no ability to control this. Currently there are many questions including who will have access to the forest in the future. For example, when will the boundary be clearly and officially made? By whom will the forest boundary be made and how? Local officials indicate that until the forest area boundaries are made clear, uncontrolled and illegal logging will continue.

Local government authorities lack the capacity to carry out demarcation sufficiently, and even in areas where this is clear, illegal logging still occurs (for example, in the Nam-Xam NPFA). While effective demarcation will not solve the illegal logging in many areas, it is important to remove it as a potential driver for deforestation and degradation.

Interviewed local government staff indicated that forest areas / boundaries are often shown on maps; however there are no signposts on the ground. Further, local officials and villagers are unclear about which forest areas are under central, province, district, and village control / responsibilities, and where these different forest types are exactly located.

Many governmental officials who are involved in forest work said they do not have a clear knowledge of the boundaries of each forest types (production forest, conservation forest and protection forest). In Xiengkhor, Houameaung and Viengxay, some interviewed DONRE staff mentioned that they do not have a clear understanding on the legal function of the three forest types, as well as their roles and responsibilities in relation to those forests. Without clear boundaries and a clear understanding on the legal status of the forest types, the ability of local government to carry out their roles and responsibilities is limited.

The experience of local government officials is that local and international land and forest boundaries are legally made with little or without their involvement or agreement. In these areas, local people make sure that they gain some benefit before somebody else takes them. In another words, they cut the trees before someone else does.

## 8. CONCLUSIONS

---

Due to the variability of available data, and issues regarding the completeness and accuracy of datasets that are available, it is difficult to accurately quantify and rank the relative impact of each identified driver. However, it is possible to identify the most likely key drivers for the purposes of targeted mitigation efforts.

While drivers are considered separately in this study, it is typically the combination and interaction of a number of drivers that lead to deforestation and forest degradation. For **deforestation**, the most important combination of factors are:

1. **Agricultural expansion**, primarily maize production, linked with **pioneering shifting agriculture** using **fire**, and **shortened fallow periods**. The increase in maize production can lead directly to deforestation as upland maize fields expand, and can also facilitate further forest cover loss by displacing upland rice production into new forest areas, and by increasing pressure to reduce fallow lengths. These reduced fallow lengths lead to a net decrease of regenerating fallow forest cover from year to year.
2. **Infrastructure development**, especially **roads**, and the increased pressure on forest areas due to improved access, leading to **unsustainable timber extraction**, and further clearing for **agricultural expansion** through **pioneering shifting cultivation**. Road building financed through allocated timber quotas is also an important deforestation driver, especially when quotas and approved logging areas are not regulated effectively.
3. **Hydropower development**, however the scale of forest loss due to hydropower development will depend on the final number and size of the proposed hydropower projects, as well as regulations regarding the associated forest clearing that accompanies hydropower reservoir clearing. Hydropower projects in remote areas also necessitate improved access and roads, and relocated households will require new agricultural land.

The most important drivers of **forest degradation** are most likely:

1. **Unsustainable wood extraction**, through legal and illegal selective logging of high value trees.
2. **Infrastructure development**, specifically new roads, as people can access new areas for timber and NTFPs.

The most important underlying or indirect drivers are:

1. **International demand for commodities**, primarily maize for animal feed for Chinese and Vietnamese markets
2. **Low law enforcement capabilities**, leading to illegal timber extraction, poorly enforced conservation and protection forest areas, and the inability of officials to ensure that infrastructure, mining and hydropower projects abide by project conditions and quotas.
3. **Poverty**, which can lead to ongoing pressure to clear upland forest areas as poorer families try to produce sufficient rice. Poverty can also lead to illegal activities such as illegal timber and NTFP extraction as households seek additional income sources.

4. **Inadequate boundary demarcation and limited management capacity**, specifically the forest loss that occurs when boundaries between different villages forest land, and between village land and protection forest land, are not clearly demarcated or understood.

## 9. REFERENCES

---

1. DAFO (District Agricultural and Forestry Office) of Xiengkhor 2014, Report on the implementation of DAFO work 2011-2012 and work plan for 2012-2013, No 34/DAFO.
2. Dale, D. Organic Shade-Grown Arabica Coffee Cultivation, Nam ET-Phou Louey Protected Area Communities, Lao PDR. Feasibility study prepared for the Wildlife Conservation Society, April 2015.
3. DEB (Department of Energy and Business) 2014, *Energy and Mining*, Tel: (856 21) 452 539-40, Fax: (856 21) 425 626, 415 442, E-mail: [energy@beb.gov.la](mailto:energy@beb.gov.la), Website: <http://www.poweringprogress.org>
4. Energy and Mining Office, Houaphan Province 2014, Report on Five Year Social Economic Implementation (2011-2015) and Five Year Strategic Planning (2016-2020).
5. Houameaung District 2014, DRAFT Report on the implementation of the social-economic development (2010-2014) and plan for 2015-2020.
6. Khatthiya, B. Presentation: Special Economic Zone (SEZ) Development and Management in Lao PDR. Lao National Committee for Special Economic Zone. 2011.
7. Lestrelin, G., Trockenbrodt, M., Phanvilay, K., Thongmanivong, S., Vongvisouk, T., Pham, TT and J.C. Castella (2013): The context of REDD+ in the Lao People's Democratic Republic: Drivers, agents and institutions. Occasional Paper 92. Bogor, Indonesia: CIFOR.
8. Moore, C., Ferrand, J. & Khiewvongphachan, X. October 2012. Assessment and Conceptualization of a Jurisdictional REDD+ Approach in Houaphan Province, Lao PDR.
9. Moore, C., Ferrand, J. & X. Khiewvongphachan (2011): Investigation of the Drivers of Deforestation and Forest Degradation in Nam Phui National Protected Area, Lao PDR.
10. Ministry of Agriculture and Forestry, Lao PDR and Agence Francaise de Developpement. Working Paper on Value Chains and Producers Organizations VC/PO, Design and Feasibility Studies, Northern Uplands Sustainable Development Core Coherent Programme. Draft, February 2009.
11. NPFA NEPL Office 2014, Report on businesses building road into NEPL NPFA (ການກວດການັກທຸລະກິດ ລັກລອບ ທະລຸເສັ້ນທາງ ເຂົ້າປ່າສະຫງວນແຫ່ງຊາດ ນ້ຳແອດພູເລີ), No. 315/NEPL, dated 27 February 2014.
12. PAFO (2014), ບົດສະຫຼຸບ ຜົນການຈັດຕັ້ງ ປະຕິບັດ ແຜນພັດທະນາ ດ້ານວຽກງານ ກະສິກຳ ແລະ ປ່າໄມ້ ໄລຍະ 5 ປີ ຄງທີ VII ນັບແຕ່ 2011-2015 ແລະ ວາງທິດທາງແຜນການພັດທະນາ ວຽກງານກະສິກຳ ແລະ ປ່າໄມ້ ຄັ້ງທີ VIII ນັບແຕ່ 2015-2020, ເດືອນມັງກອນ.
13. PAFO (province Agriculture and Forestry Office) 2013, Repot on Villages Announced by the Government as villages Successfully Eradicated Shifting Cultivation in form of Slash and Burn, Division of Extension and Farmer Organization

14. P&I (Planning and Investment Office) of Houaphan Province 2014, Statistics of the Population in Houaphan province 2011-2013, Statistics Division.
15. PONRE (Province Office of Natural Resource and Environment) 2014, Business Concession Area for Mining Survey in Houaphan province (ເຂດສໍາປະທານ ຂອງບັນດາບໍລິສັດ ລົງທຶນຊອກຄົ້ນ ສໍາຫຼວດບໍ່ແຮ່ຢູ່ແຂວງຫົວພັນ).
16. PONRE (Province Office of Natural Resource and Environment) 2014, Report on forest fire in Houaphan province 2013-2014.
17. Public Work and Transportation Office of Houaphan Province 2014, *Report on road development projects under the implementation in Houaphan province.*
18. Saunders, J. Illegal Logging and Related Trade: The Response in Lao PDR. Research Paper, A Chatham House Assessment. 2014.
19. Sopbao District 2011, Report on the Survey Allocation of Agricultural land and Forest Land 2020.
20. Thomas I, Chorn Nak, Braeutigam D, Thongmanivong S, Boulidam S, Phimminith T, Hurni K and Hett C. 2010. Analysis of land use and forest changes and related driving forces in the Lao PDR. A contribution to the REDD+ Readiness Plan. Vientiane: Department of Forestry/Forestry Strategy Implementation Project. Unpublished.
21. Travers, H., Moore, C. & A. Johnson (2011): Investigation of the Drivers of Deforestation and Forest Degradation in the Nam Et Phou Louey National Protected Area, Lao PDR.
22. Willi, Y. 2011. Of Maize and Men. Master's Thesis. Centre for Development and Environment (CDE), University of Bern, Switzerland.
23. Vongvisouk, T., Mertz, O., Thongmanivong, S., Heinimann, A. & Phanvilay, K. 2014. Shifting cultivation stability and change: Contrasting pathways of land use and livelihood change in Laos. *Applied Geography* 46, 1 – 10.
24. Xam Neua District 2009, Socio-economic Development Plan 2011-2015 of Xam Neua District.
25. Administration Office of Kouan District 2014, Report implementation a first six month work and a second six month work plan as a result of the district governmental leadership (ບົດສະຫຼຸບ ສັງເກດຕີລາຄາ ການຊີ້ນຳ ນຳພາ ວຽກງານ ຮອບດ້ານ ຂອງຄະນະບໍລິຫານງານພັກເມືອງ ໃນ 6 ເດືອນຜ່ານມາ ແລະ ທິດທາງ ແຜນການຊີ້ນຳ ນຳພາ 6 ເດືອນທ້າຍປີ, ເມືອງກ້ວນ) in 2014, No 7/, dated 25 June 2014.

ລາຍຊື່ ຜູ້ເຂົ້າຮ່ວມ ກອງປະຊຸມ ສຶກສາສາເຫດຂອງການທຳລາຍປ່າໄມ້ ຢູ່ ແຂວງຫົວພັນ (Participants to Meeting on Drivers of Deforestation Assessment in Hoauphan, July-August 2014)							
ລດ	ຊື່ ແລະ ນາມສະກຸນ	ເພດSex		ຊົນເຜົ່າ Ethnic Group	ພາກສ່ວນ	ຕຳແໜ່ງ	ເບີໂທຕິດຕໍ່
No	Name and Surname	ຊ	ຍ		Organization	Position	Tel No
<b>Province</b>							
1	ທ່ານ ວາສະນຸນ ສິນອິນໄຊ	ຊ		ລາວ	ພ ສຊຊ	ຫົວໜ້າ ຂຄປຊ	22347710
2	ທ່ານ ບຸນປອນ ມົນວົງໄຊ	ຊ		ລາວ	ພະແນກ ກປຂ	ຮອງ ຂະແໜງ ປມ	22347882
6	ທ່ານ ໄມສິ ສິດວຽເພັດ	ຊ		ລາວ	ກະສິກຳ-ປ່າໄມ້	ວິຊາການ	55093070
7	ທ່ານ ພອນສະຫວັນ	ຊ		ລາວ	ຄຸ້ມຄອງທີ່ດິນ-ກະສິກຳ	ຮອງ ຂະແໜງ	22044644
8	ທ່ານ ໄມເພັດ ແສງມະນີ	ຊ		ລາວ	ຂະແໜງສົ່ງເສີມກະສິກຳ ແລະ ສະຫະກອນ	ຫົວໜ້າ ຂະແໜງ	56510020
9	ທ່ານ ວຽງຄອນ ໄຊຍະສິດ	ຊ		ລາວ	ຂະແໜງຈັດສັນ ແລະ ພັດທະນາທີ່ດິນ	ຫົວໜ້າ ຂະແໜງ	58064814
10	ທ່ານ ພັດສະພອນ ຈະເລີນສຸກ	ຊ		ລາວ	ຂະແໜງທຳລະນິສາດ ແລະ ແຮ່ທາດ	ຫົວໜ້າໜ່ວຍງານ	56655629
11	ທ່ານ ບຸນເທືອງ ພົມມະວົງໄຊ	ຊ		ລາວ	ພະແນກ ພະລັງງານ ແລະ ບໍ່ແຮ່	ຮອງຫົວໜ້າ ພະແນກ	22346043
12	ທ່ານ ພູໄຊ ພັນທະວົງຈັນ	ຊ		ລາວ	ຂຄປຊ	ວິຊາການ	22426144
13	ທ່ານ ນ. ຈັນສະໜອນ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ວິຊາການ	55993988
14	ທ່ານ ຄຳປຽງ ດວງໄຊແພງ	ຊ		ລາວ	ທະຫານ	ພ/ງ	99869800
15	ທ່ານ ວຽງທອງ	ຊ		ລາວ	ທະຫານ	ພ/ງ	55882955
16	ທ່ານ ວົງຄຳ	ຊ			ທະຫານ	ພ/ງ	55548873
17	ທ່ານ ຄຳສອນ ຍິງທຳ	ຊ		ມົ້ງ	ແນວລາວສ້າງຊາດ	ຮອງປະທານ	55881236
18	ທ່ານ ຈິດທະວີ ດົງຫວ່າງ	ຊ			ພະແນກ ແຜນການ	ຮອງ ຂະແໜງ	28613322
19	ທ່ານ ນ. ໄພແກ້ວ ຫອມສິມບັດ		ຍ	ລາວ	ພະແນກ ແຜນການ	ວິຊາການ	23843456
<b>ເມືອງຊຳເໜືອ</b>							
21	ທ່ານ ນ. ພາລາວັນ ສິນຄຳທອງ		ຍ	ລາວ	ຫ້ອງການກະສິກຳ ເມືອງຊຳເໜືອ	ຮອງ ຫົວໜ້າ	22777887
22	ທ່ານ ຄຳເຜີຍ ທິວດາເພັງ	ຊ		ລາວ	ຫ້ອງການ ຊສ ເມືອງຊຳເໜືອ	ຮອງຫົວໜ້າ ຫ້ອງການ	23243310
23	ທ່ານ ຄຳສອນ ບຸນດວງຈັນ	ຊ		ລາວ	ຫ້ອງການແຜນການ ເມືອງຊຳເໜືອ	ຫົວໜ້າ ຫ້ອງການ	22346171
24	ທ່ານ ແພງສຸວັນ	ຊ		ລາວ	ຂະແໜງປູກຝັງ (PAFO)	ຫົວໜ້າຫ້ອງການ	56087764
<b>ເມືອງຫົວເມືອງ</b>							
26	ທ່ານ ຄຳພອນ ພັນວົງໄຊ	ຊ		ລາວ	ເມືອງຫົວເມືອງ	ຮອງເຈົ້າ ເມືອງ	55093800
27	ທ່ານ ບຸນເຕືອງ ສຸວັນທາ	ຊ		ໄທແດງ	ຫ້ອງການ ຊສ ເມືອງ	ຫົວໜ້າຫ້ອງການ	55020074
28	ທ່ານ ອ້ອມ ສຸລິນທອນ	ຊ		ລາວ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ຮອງຫົວໜ້າ ຫ້ອງການ	28820878
29	ທ່ານ ນ. ຫຼ້າພອນ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ປະທານ	55982382
30	ທ່ານ ພູວົງ	ຊ		ລາວ	ແຜນການ	ຫົວໜ້າຫ້ອງການ	56593753
31	ທ່ານ ຄຳໄຊ ປ່າເຍັດຕິວ	ຊ		ມົ້ງ	ແນວລາວສ້າງຊາດ	ຫົວໜ້າ ໜ່ວຍງານ	22877707
<b>ເມືອງຮຽມ</b>							
33	ທ່ານ ລາຄອນ ວົງລາສີ	ຊ		ໄຕແດງ	ເມືອງຮຽມ	ຮອງເຈົ້າເມືອງ	28973766
34	ທ່ານ ພອນສີ ທ່ຽງລາວັນ	ຊ		ໄຕແດງ	ຊ ສ ເມືອງ	ຮອງຫົວໜ້າຫ້ອງການ	55069637
35	ທ່ານ ນ. ຈັນສີ ສຸກກະເສີມ		ຍ	ລາວ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ຮອງຫົວໜ້າຫ້ອງການ	55657662
36	ທ່ານ ສອນ ພົມມະສິນ	ຊ		ໄຕແດງ	ຊ ສ ເມືອງ	ຮອງຫົວໜ້າຫ້ອງການ	55203378
37	ທ່ານ ຄຳອິວນ ກາງໄຊພິມສິງ	ຊ		ໄທແດງ	ແຜນການ	ຫົວໜ້າຫ້ອງການ	
38	ທ່ານ ມອນສີ ບຸນບົວພັນ	ຊ		ລາວ	ພັດທະນາຊຸມນະບົດ	ຫົວໜ້າຫ້ອງການ	99772018

Biodiversity and Ecosystem Services Safeguard Approach for the Houaphan Jurisdictional REDD+ Program

39	ທ່ານ ນ. ໄຊພອນ ສຸວັນສີ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ປະທານ	55566118
40	ທ່ານ ຄຳແພງ ແສງຄຳສັນ	ຊ		ກຶມມຸ	ແນວລາວສ້າງຊາດ	ຫົວໜ້າໜ່ວຍງານ	95324679
<b>ເມືອງຊ່ອນ</b>							
42	ທ່ານ ຄຳພຽນ	ຊ			ເມືອງຊ່ອນ	ຮອງເຈົ້າເມືອງ	96222277
43	ທ່ານ ຄອນສະຫວັນ ວົງວິໄຊ	ຊ		ລາວ	ຫ້ອງການແຜນການ	ຮອງຫົວໜ້າ	28610766
44	ທ່ານ ສຸກສິມເພັງ ແກ້ວທອງຈັນ	ຊ		ລາວ	ພັດທະນາຊຸມນະບົດ	ວິຊາການ	99527209
45	ທ່ານ ວັນເຈີ ເຍຍວຊິງ	ຊ		ມົ້ງ	ແນວລາວສ້າງຊາດ	ວິຊາການ	95558305
46	ທ່ານ ນ. ອານິລັກ ດວງພະຈັນ		ຍ		ສະຫະພັນແມ່ຍິງ	ວິຊາການ	58992698
47	ທ່ານ ພິມເພັດ ດາຄຳ	ຊ			ຊ ສ ເມືອງ	ຫົວໜ້າຫ້ອງການ	55577373
<b>ເມືອງວຽງໄຊ</b>							
49	ທ່ານ ໄມທອນ ສີສຸນາມ	ຊ		ລາວ	ຊ ສ ເມືອງ	ຮອງຫົວໜ້າ	55795834
50	ທ່ານ ສີ ພູນຄຳ	ຊ		ໄຕ	ຫ້ອງການແຜນການ	ຫົວໜ້າຫ້ອງການ	55765051
51	ທ່ານ ນ. ເດັ້ນ ທຸນວິຫານ		ຍ	ໄຕແດງ	ສະຫະພັນແມ່ຍິງ	ປະທານ	95438986
52	ທ່ານ ວົງທອງ ພິນມີໄຊ	ຊ		ໄຕແດງ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ຮອງຫົວໜ້າ	55764702
<b>ເມືອງສົບເບົາ</b>							
54	ທ່ານ ວັນໄຊ ສຸລິວົງ	ຊ		ລາວ	ຫ້ອງການ ຊ ສ	ຫົວໜ້າຫ້ອງການ	56758299
55	ທ່ານ ທະວິພອນ	ຊ		ລາວ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ວິຊາການ	99443975
56	ທ່ານ ສີ ສ່າຍເຫຼື້ອຮອງ	ຊ		ມົ້ງ	ຫ້ອງການ ແຜນການ	ວິຊາການ	56242677
57	ທ່ານ ທອງສະຫວາດ	ຊ		ລາວ	ແນວລາວສ້າງຊາດ	ຮອງປະທານ	54059098
58	ທ່ານ ນ. ສັງ ສິສະຫວັນ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ປະທານ	56129244
59	ທ່ານ ອຸ່ນຫຼ້າ ຊາຍສິມແພງ	ຊ		ລາວ	ແນວລາວສ້າງຊາດ	ປະທານ	23855801
<b>ເມືອງຊຽງຄໍ້</b>							
61	ທ່ານ ສິມນິກ ແພງສີໄຟ	ຊ		ໄຕຄຳ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ຮອງຫົວໜ້າ	55132422
62	ທ່ານ ບຸນມາ ແກ້ວພິມທອງ	ຊ		ລາວ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ໜ່ວຍງານປ່າໄມ້	55313686
63	ທ່ານ ສິມຫວັງ ຈັນທິກຸນ	ຊ		ລາວ	ພັດທະນາຊຸມນະບົດ	ຮອງຫົວໜ້າ	56207323
64	ທ່ານ ບຸນມາ ຈັນມີໄຊ	ຊ		ລາວ	ຫ້ອງການ ຊສ	ຫົວໜ້າໜ່ວຍງານສິ່ງແວດລ້ອມ	54494003
65	ທ່ານ ຕໍ່ ບຸນມາແພງ	ຊ		ລາວ	ຫ້ອງການແຜນການ	ຮອງຫົວໜ້າ	55330704
66	ທ່ານ ຄຳພັດ ອອນບົວຄຳ	ຊ		ລາວ	ແນວລາວສ້າງຊາດ	ປະທານ	22349556
67	ທ່ານ ຄຳຫຼ້າ ອິນທະວົງ	ຊ		ລາວ	ຫ້ອງການ ຊສ	ຫົວໜ້າຫ້ອງການ	55178029
68	ທ່ານ ນ. ບຸນແສງ ວິໄຈທອງ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ປະທານ	55002248
69	ທ່ານ ພູວົງ ສຸວັນທອງ	ຊ		ໄຕຄຳ	ຫ້ອງການ ຊສ	ຮອງຫົວໜ້າ	98665418
<b>ເມືອງແອດ</b>							
71	ທ່ານ ນ. ຍອງ ສິວິໄລ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ຮອງປະທານ	56365995
72	ທ່ານ ບົວເພັງ ພັນລາສີ	ຊ		ລາວ	ພັດທະນາຊຸມນະບົດ	ຮອງຫົວໜ້າ	58650823
73	ທ່ານ ພັນທອງ ເຮີ	ຊ		ມົ້ງ	ຫ້ອງວ່າການ	ຮອງເຈົ້າເມືອງ	28610288
74	ທ່ານ ສິມຊາຍ ເທັມອິນທະວົງ	ຊ		ລາວ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ຫົວໜ້າຫ້ອງການ	55881025
75	ທ່ານ ນ. ດວງ ແກ້ວອຸ່ນຄຳ	ຊ	ຍ	ລາວ	ຫ້ອງການ ຊສ	ຫົວໜ້າຫ້ອງການ	55776273
76	ທ່ານ ພູວົງ ສອນວິໄຊ	ຊ		ໄຕຄຳ	ຫ້ອງການກະສິກຳ ແລະ ປ່າໄມ້	ວິຊາການ	23845034
77	ທ່ານ ຄອນແກ້ວ ແກ້ວມົງເມືອງ	ຊ		ລາວ	ຫ້ອງການແຜນການ	ຫົວໜ້າຫ້ອງການ	23845504
<b>ເມືອງຊຳໃຕ້</b>							
78	ທ່ານ ຫິນທອງ ຫລວງຈັນສຸກ	ຊ		ລາວ	ຫ້ອງການເຈົ້າເມືອງ	ເຈົ້າເມືອງ	

Biodiversity and Ecosystem Services Safeguard Approach for the Houaphan Jurisdictional REDD+ Program

79	ທ່ານ ນ. ທອງ ສຸໄລວັນ		ຍ	ລາວ	ຫ້ອງການແຜນການ	ຮອງຫົວໜ້າ ຫ້ອງການ	56718948
80	ທ່ານ ບຸດດີຊອນສີ ມຸນວິໄຊ	ຊ		ລາວ	ຫ້ອງການກະສິກໍາ-ປ່າໄມ້	ຫົວໜ້າໜ່ວຍງານ	55557907
81	ທ່ານ ອຸດ ເດື່ອງລືໄຊ	ຊ		ລາວ	ແນວລາວສ້າງຊາດ	ວິຊາການ	55577801
82	ທ່ານ ຄວນແກ້ວ ເຫມອິນທະວົງ	ຊ		ລາວ	ຫ້ອງການ ຊ ສ	ຫົວໜ້າຫ້ອງການ	55914215
<b>ເມືອງກ້ວນ</b>							
84	ທ່ານ ດາວເພັດ	ຊ		ລາວ	ຫ້ອງການເຈົ້າເມືອງ	ຮອງເຈົ້າເມືອງ	
85	ທ່ານ ພັນ ເລືອງຄໍາພັດ	ຊ		ລາວ	ຫ້ອງການ ຊ ສ	ຫົວໜ້າຫ້ອງການ	55093555
86	ທ່ານ ກອງສີ ສິງຄໍາພັດ	ຊ		ລາວ	ຫ້ອງການແຜນການ	ຫົວໜ້າຫ້ອງການ	54316472
87	ທ່ານ ຊົມໄຊ ປຣາຢົງທໍ່	ຊ		ມົ້ງ	ແນວລາວສ້າງຊາດ	ຮອງປະທານ	54300200
88	ທ່ານ ນ. ວັນເພັງ		ຍ	ລາວ	ຫ້ອງການກະສິກໍາ-ປ່າໄມ້	ຮອງຫົວໜ້າ ຫ້ອງການ	56127485
89	ທ່ານ ນ. ແພງດີ		ຍ	ລາວ	ສະຫະພັນແມ່ຍິງ	ວິຊາການ	